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THE SEAT OF WAR.

THE accompanying Map of the Seat of War covers the ground which is likely to be the chief centre of interest during the present autumn, and perhaps throughout the winter. It includes the whole of the wedge-shaped region to the south of the Danube, now occupied by the Russian army. If the Czarewitch succeeds in maintaining his position in front of Biela, and along the line of the River Jantra, the country which will probably be occupied during the winter can already be defined. It is of triangular form, with the Danube as its base from the mouth of the Osma at Nicopolis to the mouth of the Jantra 20 miles below Sistova. The two sides are formed by the Rivers Osma and Jantra. The former, rising in the Balkans between Slatitza and Shipka, flows north to Lovatz, then takes a wide sweep to the eastward, finally turning north-west, and falling into the Danube at Nicopolis, after a course of 70 miles. To the westward, in the valley of the Vid, is the strongly-entrenched position of Plevna, still held by the Turks. The river Jantra, the eastern side of the triangle, rises in the Shipka Pass, flows northwards past Gabrova and Tirnova, the ancient Bulgarian capital, to Biela, and thence, taking a sharp turn to north-west, continues on that bearing to the Danube. To the eastward of the Jantra are the valleys of the Black and White Lom, with Ruschuk at the mouth of their united stream, and Rasgrad on the banks of the White Lom. Shumla is within the basin of the river flowing into the Black Sea at Varna; and this eastern portion of Bulgaria, from the Jantra to the sea, is occupied by the largest of the Turkish armies, commanded by a renegade German. Thus the Russian position is in the form of a wedge driven into the heart of Bulgaria, with its apex in the Balkan mountains. It cuts the Turkish forces in half, the larger army being to the east of the Jantra, and the smaller to the westward of the Osma, in the extemporised fortress of Plevna. A third Turkish army threatens the apex of the triangle in the famous Shipka gorge: and it is here that the most heroic deeds as yet recorded have been performed by the Russian defenders of the pass.

The chain of the Balkans is not connected with the Illyrian Alps, but is a distinct system, extending from the valley of the Timok which separates Servia from Bulgaria, to the Black Sea. The Balkans thus form a vast and elevated plateau, sloping gently down towards the Lower Danube, but with an abrupt descent to the south. From the Black Sea to Slivno the steep southern slopes are composed of cretaceous rocks, intersected by porphyries. To the west of Slivno these slopes are of granite and gneiss, while between Shipka and Slatitza mica-schists and clay slate predominate. The western portion of the range, bounding the basin of Sofia on the north, consists entirely of Triassic sandstone and limestone. In the copy of Hochstetter's Geological Map of Eastern Turkey, given in our number for November 1873 (facing page 328), there is a section of the Balkans a little to the eastward of Shipka, showing the lofty summit immediately above the convent of Mikhlis, and another from Trevna to Eski Zagra. A third and most instructive section, on the same map, is from Nicopolis, on the Danube, by Plevna, and across the Balkan range at the Isker defile, to the basin of Sofia. Here are shown the pliocene diluvium of the valley of the Danube, the miocene deposits of the Osma and the Vid, the upper chalk and galt, the capotrina limestone of the bases, and the Neocomian limestone of the summits, in that part of the Balkan range.

The Shipka region of the Balkan is within the crystalline zone. The strata are much contorted, and dip generally 80° south, containing many quartz reefs; and near Kasanlik granite and gneiss are found. The Shipka Pass is almost in the centre of the Balkans, half-way between the valley of the Timok and the Black Sea. From the north it is approached by following the river Jantra to Gabrova, a town inhabited by industrious Bulgarians, and consisting of about 1300 houses. Thence the road ascends, through a magnificent forest, to the actual pass, which is 4324 feet above the level of the sea. Then the first view is obtained of the plain to the south, the famous "Valley of Roses" of Kazanlik. The steep slopes and profound valleys are streaked here and there with forests of oak and beech. The route descends from the pass very rapidly, and, while the road from Gabrova to the summit is reckoned at 4½ leagues, the village of Shipka is reached in an hour after leaving the highest point. Shipka is a village with about 800 Bulgarian houses and two churches, and is situated in a gorge bordered by forests. Another hour is sufficient to reach Haskioï, in the plain, and another brings the traveller, through walnut groves and rose gardens, to Kazanlik, a town with 21,000 inhahitants.

The Shipka Pass is the apex of the triangle occupied by the Russian army; and its gorge, as well

as the whole area now forming the seat of war, is full of memories of former struggles of the unhappy people against their Turkish invaders. More than 500 years ago the Turks, under Murad I., overran Roumelia to the foot of the Balkans; and their sanguinary leader made Adrianople his capital in 1362. But for nearly a century the inhabitants of the country, the Servians and Bulgarians, continued a desperate and heroic struggle against the ferocious invaders. The crushing defeat at Kassowa in 1390, when Murad was killed in the moment of victory, did not end the contest, although it probably made it desperate for the time. The struggle has continued, at intervals, until this day, and the Turks are now, as they were then, a horde of invaders and nothing more. It was in the Shipka Pass that Marko, the national hero of the southern Slavs, long defended his country against the Turks; and the patriotic struggle was not without gleams of hope. John Hunyad on one occasion defeated the invaders, and advanced as far as Sofia. On another he penetrated into the heart of the Balkans in the dead of winter. The chivalry of the west came to the aid of the patriots; and "hope for a season bade the world farewell" when the ferocious Bayazid routed the Christians at Nicopolis in 1444, and massacred a hecatomb of prisoners. But only for a season. The ruthless invaders have fixed their deadly grip on their victims for more than five centuries, and for that time the whole Balkan peninsula has been overrun, and its inhabitants ground to the dust, except in one favoured spot. Montenegro has remained unconquered, and is unconquered still.

The parallel is, in many respects, very striking between the struggle of the Spaniards against their Arab conquerers, and that of Servians and Bulgarians against the Turks. In Spain, when the flood of invasion covered all the land, one spot remained free, and the little Gothic kingdom of Asturias was never subdued. So in the Balkan Peninsula ruin spread over the whole land, except among the recesses of "unconquered Tsernagora." As in the Iberian Peninsula the people gradually formed the independent kingdoms of Portugal, Aragon, and Navarre; so in the Balkan Peninsula the men of Roumania, Servia, and Greece have, one by one, after most heroic struggles, escaped from the blighting grip of the invaders. At last, after 500 years, St. Ferdinand conquered Seville, and the Arabs were confined in the small district of Granada until the end came. Broussa should soon be the Turkish Granada; for the 500 years of desolation and ruin in the Balkan Peninsula, dating from the battle of Kassowa, is within thirteen years of its completion.

There is, however, one fatal difference between the two cases. The Spaniards, as regards the means of offence and defence, were in those days almost on an equality with their invaders. But the invention of arms of precision has made a successful war for freedom, without foreign aid, an impossibility to the half-armed and unarmed people of the Balkan Peninsula. The Turks were always famous for their obstinate valour in the defence of fortified positions; and they have now shown that they are equally formidable in the field, when excited by fanaticism and hate. Against armies of such men, supplied with all the most improved weapons of modern warfare, there could be no hope for their victims. A life of degradation and oppression, with the prospect of hideous massacres at every sign of resistance, was before them and their children's children if no foreign aid should come.

Last year the indignation of all Europe was aroused against Turkish misrule. The Powers united in remonstrances and in demands which were not to be enforced. The Pashas were ready to institute mock parliaments—to make any promises of reform—as they always have been since the commencement of Turkish decadence. But they wisely refused to give any guarantee, because they knew that the performance of their promises was impossible. A conquering Turkish horde, of a different race and religion from the conquered, never has governed and never can govern. It can conquer, massacre, and extort payment of taxes; but it cannot, and never will, administer justice, nor perform the ordinary acts of government with any approach to efficiency. Alone among Turkish conquerors, Akbar was a good ruler in the European sense; but he had ceased to be a Muslim, and was only half a Turk. Where there is not, and never has been, efficient government, there can be no duty of allegiance, and no treason in resisting the invaders.

But there was no hope for the inhabitants of the Balkan Peninsula without foreign help. It was a just cause; and there was a time when the people of the west would have adopted it as their own. For this very cause the bravest knights of France and Flanders were massacred at Nicopolis. For it the gallant Boucicault encountered every form of peril; and for it the brave Enguerrand de Coucy, the flower of western chivalry, rotted in a Broussa dungeon. For the same cause Hastings and Church fought, and Byron died. It was to help an oppressed people to throw of the yoke of cruel invaders that Francis Vere bled at Nieuport, and Philip Sydney received his death wound at Zutphen. But these are not the days of Vere and Sydney, nor even of Hastings and Byron. The English will not interfere unless "British interests" are threatened. It is no longer a part of "British interests" to fight the good fight in which Sir Philip Sydney died and Frank Abney Hastings immortalised his name—the fight for freedom and against foreign oppression, the only cause in which war is justifiable. Help must come, if at all, from elsewhere.

It has come. The Russian people forced their Emperor into a contest, with the object of securing deliverance for the unfortunate races, who, for nearly five centuries, have groaned under the Turkish yoke. The struggle has proved more desperate, and even more doubtful than was anticipated. Admirably armed, actuated by the strongest motives of self-interest, and by desperate fanaticism, the Turkish invaders have displayed all the tenacious valour of their ancestors, and have already inflicted appalling losses on the Russians and on their native allies.

Still the work was well begun. The Turks are not a people, but merely an invading horde, not numbering more than 1,388,000 souls in Europe, including the Tatars of Tulcha, or about 350,000 fighting men; 300,000 not counting the Tatars. This is an army not a people, and it cannot be much more than doubled by the Turks of Anatolia. Time will tell against them, for recruiting from the same materials is not possible, and it is the Ottoman Turk who is the

formidable soldier. On the other hand, the Russians have shown the same valour as of old, and they are recruited from a people numbering 80,000,000. They are in a friendly country, and have the active assistance of the Roumanian nation, numbering 4,000,000 souls. Their military position is central, cutting the Turkish forces in two; and the oversights and mistakes of an opening campaign will, it may reasonably be expected, be avoided as experience is gained.

The Russian and Bulgarian defence of the Shipka Pass is the chief glory of their first campaign. The Turkish army of Roumelia commenced the attack on the 21st of August, advancing directly against the scarped heights in front of the village of Shipka. The garrison of the pass then consisted of the Bulgarian legion and of a regiment of the 9th Russian division, both much weakened by previous hard fighting, and not counting more than 3000 men and 40 guns, without any succour nearer than Tirnova, a distance of 40 miles. After a desperate resistance behind their first line, they retired in good order in rear of Mount St. Nicholas, the loftiest part of the pass; with a loss of 200 men, chiefly of the Bulgarian legion. On the second day the Turkish attack was less animated, as they were engaged in making a flank movement to the right and left of the Russian position. On the third day the little band of heroes was attacked in front and on both flanks by 50,000 men, and their leader, Stoletof, conducted the defence with impetuous valour. At the most critical moment a brigade of the 9th Division, under General Dorojinsky, arrived from Selvi, and enabled the defenders to hold their ground, but with an overwhelming force of Turkish invaders attacking them, not only in their front, but also on both flanks. The two generals believed their destruction, and that of their gallant comrades, to be inevitable. They sent off a last message to the Czar, declaring that they would all defend the pass to the last drop of their blood. The soldiers were covered with dust, broiled by the sun, exhausted with the heat, fatigue, hunger and thirst. With the triumphant shouts of the assailing Turks on all sides ringing in their ears, the heroic little band still fought on. On a sudden Stoletof uttered a cry of joy. A long column could be seen winding up the ascent from Gabrova. The head of the column of succour approached Mount Karaula and deployed on the little plateau. It consisted of cavalry. Soon the infantry came up, and breaking into skirmishing order, began to climb the heights on the right. Then puffs of smoke were seen to rise from every rock and bush. It was a brigade of carbineers, under General Radetzky, who now attacked the Turks, without having halted for a moment after a march of 20 miles. While this advance was made over the heights, the main reinforcements marched direct to the entrenchments at the head of the pass, where Radetzky at once assumed the command. On the fourth day the Russians assailed the Turks threatening their flank, and they were helped by the people of the country, who carried water to refresh the combatants under a heavy fire. Later in the day, Dragomirof arrived with two more regiments; but it was found that the Turks were in great force in the woods on the left, commanding the road from Gabrova. Here the fighting was long contested. The brave Dragomirof was rendered *hors de combat* by a ball in his knee, but the defenders of the pass were successful; the Turks were driven back, and the position was freed from the danger which threatened its right flank. Then Radetzky led another attack in person, and drove the Turks from their last position at the point of the bayonet.

For twelve successive days the position of Radetzky was assaulted by the Muslim invaders, who made 104 distinct aggressive movements, and every time they were hurled back with heavy loss. The Russians held Mount St. Nicholas, the highest point of the pass, and the crests of two hills on either flank; while the Turks, in vastly superior numbers, had extended their lines down some flanking ridges, nearly to the Gabrova road (the only line of retreat), until they were dislodged by the succouring column led by Radetzky. Again, within the last few days, the Turks have made a desperate attack on Mount St. Nicholas, after a long cannonade, and again they have been hurled back with tremendous loss.

To the natives of the country, this heroic defence must be an omen of future success, and of the final expulsion of the invaders. For it was on this same spot that Marko, their national hero, made his brave stand against the Turks when they first overran the land in the fourteenth century. And here, once more, the long struggle is renewed, for the time successfully. While the apex of the triangle was thus valiantly defended, and a whole army of Turks was kept fully employed by a handful of Russians, it has been and will be the business of the main army, now reinforced by the Imperial Guards, to invest Plevna and defend the line of the Jantra. If they fail, the Danube must be re-crossed and the Shipka Pass must be abandoned, as well as the towns within the triangle. If successful, they will be in a position to advance to the completion of their work, and to exact that liberation of the people of the Balkan Peninsula, by force of arms, which was insolently refused when solicited by the united voices of England, Germany, Austria, France, Italy, and Russia. The sacrifice has been terrible; but the object is no less than the liberation of millions of people from a cruel and oppressive tyranny.

M. DUPUIS' EXPLORATION IN TONG-KIN AND YUNNAN.

M. J. Dupuis, the French traveller, known for his explorations in Tong-kin, and for his strenuous endeavours to open up in that direction a trade route from South-western China, has communicated to the Paris Geographical Society an account of his travels.

He had endeavoured in 1868-9, on the occasion of a visit to Yunnan, to enlist the co-operation of the mandarins, and in the latter part of 1870 he returned thither to prosecute his journey. On the 25th February 1871, M. Dupuis left Yunnan-sen in the company of his secretary, Wang, a literary mandarin, and embarked on the canal, which communicates with the adjoining lake, a beautiful sheet of water about 43 miles long, and from 14 to 17 miles in breadth. The mountains rise from the lake on the western side in the form of terraced cliffs, which, during the rainy season, are covered with scanty vegetation. The eastern side, on the other hand, is well cultivated and

peopled. The outlet to the lake is on the western side, and, after turning abruptly northward, joins the Kinsha-kiang or great Yang-tse. After eight hours' navigation, Kwen-yang was reached, a regular shaped town of about 10,000 to 12,000 inhabitants, but reduced, in point of numbers, to 3000 or 4000 by the Muhammadan insurrection. Ngan-lin, situated westward of the lake, on the river issuing therefrom, occupies a point on the road between Yunnan-sen and Tali, and has been entirely destroyed by the Muhammadans. The people call themselves Chinese, but, having mixed with the aborigines, have lost many of the characteristics of the former. Ho-long-tse, to the north, is famous for its hot springs, and there are here pagodas provided for bathers. After having returned to Kwen-yang, M. Dupuis proceeded southward and crossed the water-parting between the basins of the Yang-tse and Si-Kiang. The plain of Sin-shin beyond is about 18 miles by 8, and is certainly the richest in Yunnan, yielding, as it does, three harvests per annum. The town of Sin-shin is more important than that of Kwen-yang. In 1871 it was in the hands of the Muhammadans, but these have since been ousted from power. From Sin-shin there are two routes to Tong-hai, one by way of the Tong-chan, and another by the Tong-kow Valley. The former contains fifty-two towns and villages, with numerous pagodas, while the latter is inhabited almost entirely by a race of savage mountaineers who had not succumbed to the raids of the Muhammadans. In the Shi-ngo mountains, to the south west of Sin-shin, there are iron mines and foundries. The mountaineers referred to are strong, hard working, and hospitable. The women carry round their necks plates of silver, on which are embossed figures of animals and characters.

Before reaching the Tong-hai Lake, M. Dupuis stayed a few days with the Chinese General Ma, who had come to take the town of Tong-keow, a town which had been seized by the Muhammadans, and which they did not yield before they had been reduced to their last supplies, and had actually poisoned their own wives and children.

M. Dupuis remarks that this bloody rebellion arose from some quarrel regarding the working of certain gold mines, in 1855, and that Chu, the *futai*, or governor, of Yunnan, then ordered by proclamation a general and indiscriminate massacre of all Muhammadans. This proclamation was said to be due to the instigation of the treasurer, or *fan-tai*, a young but able Tartar, named Tsin-chen. The slaughter of Muhammadans at Posi, Hoa-si, and in the vicinity was enormous; but the Muhammadans were soon on the alert, and the retaliation effected by Ma-hien, who placed himself at their head, actually caused the death (so M. Dupuis was informed) of a million people. Ma-hien, having become master of a portion of the province, then came to terms with the Chinese, was created marshal by them, and undertook, in return, to stamp out the rebellion in the west. He did his best to persuade Dupuis to put off his journey, but without success, as the latter continued his journey across the lake to Tong-hai.

Tong-hai was the next town in importance to Yunnan-sen seen by the travellers. They were received with great coldness and suspicion by the Governor, Hu—a savage with a thin veneer of Chinese civilisation. He, nevertheless, appeared to manifest some interest in the question of the future trade route, and, offering him an escort of 200 men, recommended Dupuis to repair to Lin-ngan. This advice was, however, considered unsafe by M. Dupuis, and, accordingly, he set out north-eastward for Ning-chow on the 14th April. Kwang-y, a town to the south, acquired fame subsequently through its siege and desperate defence, which lasted fifteen months, and caused the death of two-thirds of the garrison.

At Laly-kai, on the upper Yu-ho, cholera—which had appeared in Yunnan, in the track of rebellion—was so virulent as to have occasioned the flight of the inhabitants. The Laly-kai and Hoasi valleys have both been subject to the raids of the Posi and Kwang-y rebels, and the inhabitants have had to keep a constant watch over their fields and dwellings. Both Laly-kai and Shin-tien-ge, a little to the south-east, are situated in the valley of the Yu-ho, or Canton River. Hami-chow, still further to the south, is situated in a remarkably rich plain, but the town itself is wholly destroyed, and the neighbourhood in the hands of the Muhammadan rebels. These, however, to the number of 2000, accorded a friendly and even grand reception to the travellers. At Mon-tze, further south, the country becomes more sterile, and the spurs of the great mountain range stretching from Tibet to the Gulf of Tong-kin are reached. The inhabitants of these mountains are called Yjens, or savages, by the Chinese. Mon-tze is a great trade-centre for products of southern and central Yunnan, which go to Kwei-chow, Quang-si, or down the Canton River. The principal articles are metals, tea from Pu-yul-fu, cotton from the Laos people, on the Mekong side. Tin is obtained from mines about 20 miles to the south, which have yielded the metal for a century past. At Mon-tze, M. Dupuis was left by his secretary, Wang, to pursue his journey with a civil mandarin and 80 men. After journeying through the mountains to the south, M. Dupuis came in sight—on the 23rd April—of the Hong-kiang, or Red River, at Mang-hao, where it is over 100 yards wide. The surrounding mountains are between 5000 and 6000 feet in height, from base to summit, which would make the plain of Mon-tze about 3000 feet above the level of the river. Mang-hao is not visited by the Yunnan people, owing, apparently, to the difference of temperature, and its effect on their health. About 35 miles to the south there are mines yielding gold, silver, copper, tin, lead, coal, and other minerals. The frontier between Yunnan and Tong-kin touches the Red River about 22° 35′ N. latitude, and, following its course for about 20 miles, finally quits it at Lao-kai, where the territory occupied by independent tribes between China and Tong-kin commences.

M. Dupuis remarks of Yunnan, that it is, without doubt, the richest metalliferous country in the whole world, and that nearly all the minerals are to be found on or near the surface. In the south and south-west of the province, the Chinese form about one-tenth of the population, and inhabit the towns, the valleys, plains, and nearly all the fertile tracts. The temperature is most equable, and rarely ascends above 26° C., or descends below zero.

Lao-kai, as well as Mang-hao, is now in the hands of the Black-flag bandits, who slew Francis Garnier and four French companions in 1873. These bandits

levy custom dues on all goods passing Lao-kai, and derive thence an annual revenue of upwards of five and a half millions of francs. Below Lao-kai are to be found extensive forests, which yield very superior timber of different qualities. The fauna of the region is very exuberant; the elephant is found in herds on the southern bank, but never crosses to the northern; the buffalo, wild ox, and rhinoceros are also found. The royal tiger runs to a great size, and panthers, leopards, and large grizzly bears are common. Deer, wild goats, wild boars and chamois form part of the game, and the musk goat and wild sheep frequent the upper part of the river near Yunnan. Among feathered game are to be met the peacock, several kinds of pheasants, partridges, and numerous specimens of aquatic birds.

The Black-flag bandits appear to wish seriously to obstruct the efforts of the French to open up communications between Yunnan and the coast, and M. Dupuis is of opinion that little can be done to further trade till they are reduced to subjection.

Many gold mines are said to exist in the country of the Muong-la, on the Black River, between the Red River and the Mekong. Silver is also exceedingly plentiful there. M. Dupuis remarks of the independent tribes between the Red River and Yunnan that they recognise as chieftain a certain chief who lives at Shuien-tien, in the mountains close to China, in the direction of Ho-yang, and claims descent from the former sovereigns of Yunnan. M. Dupuis halted at Kwen-tse. Here the forests terminate, and cultivation makes its appearance, rice, sugar, tobacco, cotton, &c., being produced in the proportion in which they are enumerated. With regard to the He-ho, or Black River, he remarks that its course has been laid down entirely erroneously hitherto. Its confluence with the Hong-kiang has been placed at Lao-kai hitherto, whereas really it joins that stream near Hung-hoa. It is navigable for boats as far as Muong-tai. The Clear River, on the north-eastern or left bank, is navigable for nineteen days' journey from its confluence with the Hong-kiang.

Between Mang-hao and Long-po the navigation of the Red River is difficult, owing to the number of rocks and boulders which obstruct the centre of the channel, and a system of towing by chains or wire ropes may become a necessity. M. Dupuis returned to Yunnan on the 28th April, and finally reached Hankow on the 16th December 1871, having traversed in all upwards of 6000 miles.

His second expedition, consisting of two gunboats, a steam launch, and a large junk, as tender, left Hong-Kong on the 26th October 1872. He was detained for some time at the mouth of the Red River, owing to the intricacy of the channels, obstructed as they are by the sand brought down to a distance of ten miles. A detailed survey is much required. The tides here, M. Dupuis observes, last four-and-twenty hours, and the high tides re-occur about the 1st and 15th of the month. The Trali proved to be the channel used for navigation, though the Balat is the largest.

An interview with the Royal Commissioner, Ly, at Hai-phong, was obtained by M. Dupuis, through Commander Senez, of the 'Bourayne.' The Commissioner said the proposed opening up of the Red River must be referred to Hue; but, on the departure of the 'Bourayne,' he threw off the mask, ordered barriers in the river to be erected, and forbade any provisions to be supplied to the expedition. Accordingly, M. Dupuis, seeing the importance of prompt action, began to ascend the river Cam, from Hai-phong, as far as the Thai-binh River, where, at a place called Lu-to-kiang, the people were less hostile, and brought supplies. M. Dupuis explored the Song-ki Canal, between the Thai-binh and the Red River; but, at a distance of 7 miles from the latter, his steam launch was obliged to return, owing to the want of sufficient water. As far as Bac-ninh the land on either hand of the river Cam is low and deltaic; but on the left bank may be seen the spurs of the great range which surrounds the delta. To-ha, above Bac-ninh, is a large place of from 10,000 to 12,000 inhabitants, and various articles of earthenware are there manufactured. A smaller canal is in existence, some distance above To-ha, but it is only navigable at the rainy season. At its confluence the Thai-binh diverges to the north. Here M. Dupuis decided to return, and to seek communication with the Red River by the Trali mouth; but about 15 miles before reaching the mouth of the Thai-binh, an arm of the Red River, called Cua-loc, and of 1 fathom minimum depth in the dry season, was discovered. After considerable obstruction had been raised by the Annamites, who spoke of M. Dupuis as the precursor of "the brigands of Saigon," the expedition finally entered the Red River on the 18th December, and arrived at Hanoi four days later. All means were employed by the Annamites so as to discredit the Europeans; but the pacific demeanour of the latter soon quieted the natives and the Chinese traders, of which there are a great many.

M. Dupuis observes that when the country is open to commerce, navigation will be by way of the Thai-binh and Cua-loc, and from Hanoi up to the frontier of China. During the dry months, vessels will be obliged to tranship goods in the Cua-loc on to flat-bottomed river boats, drawing 6 to 7 feet. The delta of the Red River has been surveyed recently by Messrs. Bouillet and Heraud. The entire navigable distance of the river from the mouth of the Thai-binh, by way of Cua-loc and Mang-hao, is 414 miles.

The chief article of cultivation in Tong-kin is rice, and next to that, silk, the centre of which industry is the valley of Thai-nguyen. The silks are light and inexpensive, owing to the cheapness of labour, but are badly prepared for the market. Embankments, which serve also as roads, are numerous in Tong-kin, owing to the disastrous effect of the rains. The population is found almost entirely in villages, isolated farms and houses, as in China, being unusual. The agriculturists are the most numerous and the most moral, the mandarin class being dissipated and extortionate.

M. Dupuis was favourably received at Kwen-tse, though instructions of a hostile nature to him had been sent to the Annamite general there, and though a barrier across the stream was actually being constructed. He nevertheless managed to pass it, and was eventually received with open arms at Lao-kai and Mang-hao, whence he made his way to Yunnan. He records, in conclusion, his opinion that nothing but a little energy and perseverance is required to make this promising route one of considerable importance.

We ought to mention that a map giving detailed topographical information accompanies M. Dupuis' article.

DELTA OF THE YANGTSZE RIVER IN CHINA.

M. ELIE DE BEAUMONT in his *Leçons de Geologie Pratique* remarks that "the different forms of river deltas appear to be only varieties of the same fundamental type. The phenomena which contribute to their formation, and the process even by which human industry affects them, have everywhere the greatest similarity; and the circumstance that these phenomena present a series of phases almost as marked as those of the development of an organized being, greatly augments the interest of their study." If we apply these pertinent remarks to the subject in hand, and compare the Delta of the Yangtsze with that of the Ganges, they are fundamentally the same in their geological formation, but in their geographical features they differ as much as the Chinese of the pure Mongol race do from the Hindu. On referring to a map of Asia it will be seen that the latter disembogues into the Bay of Bengal through numerous mouths branching from the main stream, three of which form considerable subsidiary rivers; while the former has only one embouchure into the North Pacific Ocean, but divided into two great branches by the island of Tsung Ming. Notwithstanding this marked difference in the estuary of the Yangtsze from that of the Ganges, the extent of the delta is equally as great on the seaboard, and its area inland still more so, where the subsidiary waters of the Great River (*Tai Kiang*)—as it is sometimes called by the Chinese—spread out into a series of lakes or lagoons; the *Tai Hoo*, or Great Lake, forming a central reservoir for the innumerable smaller channels, which intersect the greater surface of the delta with a network of canals and ditches. If, therefore, we designate the alluvial lands of the Indian river through which its ana-branches flow into the sea a *River-delta*, those of the chief Chinese stream may be appropriately termed a *Lake-delta*, as forming the leading characteristic of its geographical features.

On ordinary maps of China this lake feature of the Yangtsze Delta is not well defined, as most of them have been projected on the basis of the old surveys made by the Jesuit fathers upwards of two centuries ago; and our Admiralty charts, which delineate the river and sea boundaries correctly, but do not give more than a general outline of the delta. This deficiency, so far as the southern section is concerned, was made good during the latter years of the great Taiping Rebellion, 1862–5, when Colonel Gordon succeeded to the command of the disciplined Chinese troops, which assisted chiefly in suppressing the civil war in China. Under his directions, Lieutenants Sanford, Lyster, and Maude, of the Royal Engineers; Lieutenants Danyell and Bateman, of H.M.'s 31st Regiment, Assistant Engineers, and a detachment of Sappers and Miners, surveyed the greater part of the delta, frequently exposed to the fire of the rebels, and other dangers incident to warfare between semi-barbarous belligerents. The results of that survey, under exceptional difficulties, were forwarded to the late Sir Henry James, Director of the Topographical Department of the War Office, Southampton, who had two maps printed by the zincographic process, one on the scale of an inch to the mile, and the other five miles to the inch, and entitled "Military Plan of the Country around Shanghai." This plan presents at a glance the characteristic lake features of the delta, over a triangular area, measuring 180 geographical miles along the right bank of the Yangtsze; about the same distance on its south-western surveyed boundary; and 122 miles of its frontage to the sea, the whole superficies approximating to 5400 square miles.

About the central region of that area the lake districts are well defined, excepting one to the westward, which was not entirely surveyed. However, the shores of the Tai Hu, or Hoo, are laid down clearly, and the rocky island and banks to the east and west, which form exceptional features in the general aspect of the delta, which is that of a level plain only a few feet above the river at high floods, and the sea at spring tides. According to the plan this Great Lake is, in round numbers, 150 miles in circuit, something in the form of the Phrygian cap of liberty, and an area of about 750 square miles. To the eastward, about 15 miles from the mid-shore, stands the famous city of Soochow, beyond which a series of small lakes begin, and stretch onwards towards the south branch of the estuary, forming the leading channel up the Yangtsze, and to its branch stream the Wong Poo, where the harbour and settlement of Shanghai are situated. There are twelve of these, all united to each other by narrow channels through the alluvial soil, with areas of dry land between, which at some former period were submerged, and formed one large lake, but not half the superficies of the Tai Hoo.

Looking at this territory from a geological point of view, we perceive a remarkable example of sedimentary deposit formed by the turbid waters of the Yangtsze, charged with the abrasion of rocks from 1000 to 2000 miles in the upper gorges of the river. Evidently, at a comparatively recent epoch in the formation of strata, the mouth, or probably mouths, of that mighty stream were near Chinkeang, as shown in the plan, 160 miles from its embouchure at Shanghai; all the intervening area from these points to Hang-chow, at the south point of the triangle, having been covered by the sea, with the groups of hills in its central region rising as islands, like those in Tai Hoo Lake, and off the coast before entering the estuary. As the current of the river met the flowing tide, the sediment *in situ* was deposited, and thus, in time, formed the vast surrounding plain. The rapidity of this formation may be estimated from a few facts culled from Chinese history. From this we learn that in the tenth century of the Christian era, and during the reign of the Sung dynasty, Shanghai first received its name—from *shang*, high, and *hai*, sea, which means literally "upper sea." "The account which seems most probable, as it is the most natural, is that there were two regions or rivers, one designated the *Lower*, and the other the *Upper Sea*; and hence, it is said, was derived the name. Others say that there were eighteen great rivers, among which one was called the Lower Sea, and another the Upper Sea, and hence the modern name. We also find the characters reversed—*Hai Shang*, 'Upon the Sea,' indicating that the city or district was situated contiguous to or upon the sea."*

* *Chinese Repository*, vol. xvi.

The foregoing quotation was written by Dr. E. C. Bridgman, the learned editor of the *Chinese Repository*, whose accuracy and knowledge of Chinese have constituted that rare serial—the publication of which ceased thirty-six years ago—one of the chief authorities on the history of the empire. Of the accounts given as to the derivation of the name, we incline to the last mentioned, "Upon the Sea," as it accords most with the geological and geographical changes in the district, where, within the memory of living residents, native and foreign, the land on what is called the Pootung Peninsula has encroached upon the sea from 1 to 2 miles, and the waters shoaling in proportion, so that some years ago the Kintoan Beacon, marking low water mark, on the muddy shore, had to be moved several hundred yards. At present Shanghai is 17 miles distant, in a straight line from that point, and it requires no great stretch of theory to infer that at the period referred to—A.D. 960—the city was walled in, and its name changed from *Lan* to *Hai Shang*, "Upon the Sea," and since then, when that became no longer appropriate, the characters were reversed into Shanghai, without any specific geographical meaning.

In another paragraph of his introduction to the "Description of Shanghai," as situated in the ancient province of Kiangnan, now divided into the Kiangsee and Kiangsoo provinces, he remarks:—"Once, no doubt, the eastern plains of Kiangnan were partially if not wholly beneath the surface of the sea, but the earth accumulating has by slow degrees driven back the waves. The water-courses, however, are still very numerous, and some of them deep; and the currents, moving with the rising and falling of the tides, very powerful. Consequently, many of the channels have changed their beds. The river Woosung is an example of this. 'Twelve centuries ago, in the time of the Tang dynasty,' says the Chinese historian, 'the river of Woosung was twenty *lee;* in the time of the Lung dynasty it was nine *lee;* afterwards it gradually lessened down to five, to three, to one *lee*." As there are three *lee* to one mile this branch of the Yangtsze has dwindled down from seven to less than one half in width during 1250 years. In the sequel, it will be shown that this is an important fact, leading to serious changes in the harbour of Shanghai. Meanwhile, let us revert to the statement from historical records, "that there were eighteen great rivers" in the delta. If we accept this as founded on fact, it points to a period when the Yangtsze had several "mouths" for its outlet into the ocean, similar to those of the Ganges. On reference to Gordon's map, this is supported by the tortuous reaches of the river below Chinkeang, which are probably the old arms of some of these mouths, which in time have closed up on the southern bank, and altered the features of the region between that locality and the sea from a river to a lacustrine delta. Assuming this to have been the case, there is evidence to show that this closing up of the great channels, and forcing the surplus waters into the main stream, besides innumerable small channels, was materially assisted by the agricultural industry of the inhabitants. From time immemorial the Chinese located on these low lands have been in the habit of raising dykes, like the Hollanders in the Netherlands, to reclaim the deposits of sediment by the river, and defend them, when cultivated, from the flooding of the stream, or the encroachments of the sea. In this manner, and by the increasing labours of the most industrious population in China, numbering at the present day not less than ten millions, they have assisted nature in contracting the great branch streams to insignificant channels in width, but which, by their length and multiplicity, render them of the utmost importance as canals for navigation or ditches for irrigation.

Of these the famous Grand Canal intersects the delta from Hang-Chow Foo in the south to Chinkeang in the north, traversing the country to the eastward of Tai Hoo Lake, and passing through the city of Soo-Chow Foo. In the environs of the latter city there are branches from the great canal which lead into the great lake to the westward, and the group of smaller lakes to the eastward. These, with the Shang Fang Hills, which overlook the city and its suburban waters, render it one of the most picturesque spots in China. Before it was ravaged by the Taiping rebels, the Chinese spoke of the capitals of Kiangsoo and Chekiang in their flowery language:—"Above, there is paradise (or the palace of Heaven); below, are Soo-Chow and Hang-Chow." This was specially applicable to the luxurious residences with gardens in the vicinity of the lakes, when these cities reached the acme of prosperity from which they have declined.

This lake district was known to the English and other foreign residents at Shanghai; but few, if any, had a definite idea of the position, extent, and number of them. On ordinary maps the Tai Hoo was laid down, but its outline was variously delineated, and none of them correct, without any of the smaller lakes shown. This section of Gordon's map is, perhaps, the most interesting and novel portion of it, and we have gleaned much useful information about their capabilities of navigation not previously known. The Great Lake, as already stated, is over 150 miles in circumference, with a superficies approximating to 750 square miles. It is from 10 to 15 feet deep, with shallower water here and there, that should be avoided by vessels drawing 6 to 8 feet. There are numerous entrances to it, from all points of the compass, for small native boats, but only one for large junks or small steamers. The latter is at the extreme eastern boundary, where its waters form into a small subsidiary lake near Wu-Kiang. Here the navigation is intricate, as there is a bar at the entrance, with a channel leading to it, which should be approached only at high water. Once inside the lake, it presents a most picturesque prospect, with an extensive horizon, broken only by the hills on its eastern and northern shores. The highest range is the latter, some of the hills rising to a height of 800 feet, covered with grass and herbage, where, in peaceful times, sheep and cattle browsed. The islands are highly cultivated, and infested by pirates, who, it is said, have never been subdued by the imperial authorities, so that they live an independent, lawless life, preying on their industrious countrymen living on the mainland.

The smaller lakes have an average depth of 9 feet, but most of them shoal on their eastern shores. There has always been considerable traffic on these lakes, and the surrounding country was in the highest state of cultivation, with a dense industrious population before Soo-Chow fell into the hands of the Tai-

pings. When the rebellion was thoroughly subdued in 1865, those who had survived its sanguinary ravages returned to their homes, so that now it has recovered in a great measure its former smiling aspect. The facilities for commerce in this district by water communication are extensive, for small steamers as well as junks. During his campaign, Colonel Gordon navigated the creeks, canals, and most of the small lakes in the 'Hyson' steamer, drawing eight feet water. From Shanghai he took that vessel through intricate channels, delineated on his military plan, to Tai-tsan; thence to Soo-Chow, and on through the Tai-Hoo Lake, to Kin-tang, a town on the western shore of a large lake, which he had not the opportunity of surveying completely before the disciplined Chinese force he commanded was disbanded and he had left the country, after a most arduous and eventful campaign of three years.

Regarding the smaller channels, it was impossible for Gordon and his gallant military surveying party to do more than indicate their intersection at the points he passed them in his linear measurement of the more important creeks and canals in his line of communication for military purposes. At an approximate estimate, we calculate the area of all the lakes at 1200 square miles, and deducting this from the computed superficies of this southern section of the Yangtsze Delta, delineated on the plan, at 5400 square miles, the remainder is 4200 square miles of land intersected by these small channels, used for navigation and irrigation. As already stated, the whole net-work of water communication is not laid down on the map, but the intersections are; consequently we can arrive at some estimate of their extent. These are more numerous in some districts than others, but taking an average of those within 100 square miles on the Pootung Peninsula eastward of Shanghai, we find more than 200 miles of water ways, ranging from 5 to 15 feet. Reducing this average, however, for the sake of accuracy to 120 miles, and the whole area of land intersected with first-class channels to 3000 square miles, we have the total length computed at 36,000 miles of creeks, canals, and ditches, nearly the whole being navigable by sampans, junks, and steamers of various sizes. The actual linear measurement surveyed by Gordon and his staff was not less than 1700 miles, including the grand canal, and if we add the circuits of the lake shores at 280 miles, we have a total of 2500 miles surveyed by theodolite and chain on the Delta of the Yangtsze. A writer in the *Times*, commenting on this survey, says:—"Such a task undertaken in a peaceable country would be one of no small magnitude; but when we consider that nearly the whole of it was performed in the face of a bloodthirsty enemy, the surveyors being frequently under fire, and at all times risking their lives from the attacks of marauders, or the deadly malaria of that marshy region, this map illustrates an example of 'the pursuit of knowledge under difficulties,' that redounds to the credit, skill, and perseverance of Gordon and his staff of Royal Engineers." To this we may add Assistant Engineers and Sappers.

The only region in Europe that can compare with this system of natural and artificial channels for navigation and irrigation is the Delta of the Po, and the Plain of Lombardy. About one-sixth of the whole plain is irrigated, and about one-fifth of its productive area, equivalent to 1658 square miles. Many of the larger canals are used for navigation and commerce as well as irrigation; and the entire length of the great canals, with their first-class branches has been estimated at 4500 linear miles, using up one half of the average discharge of all the affluents and the main stream. If we double that total, to include all the smaller channels for irrigation, this would give 6 miles to every square mile, or 9000 in all, and still that is only one-fourth the extent of the Yangtsze Delta water ways as they are delineated or indicated on Gordon's map, which extends to not more than probably half that alluvial region.

Referring again to the statements of the Chinese historian, quoted by Dr. Bridgman from a work entitled *Kiaking Shanghai hien chi*—A Statistical account of the district of Shanghai in the reign of the Emperor Kiaking—he says, after showing the contraction of the Woosung River from 7 miles to one-third of a mile:—"The beds of other rivers have been gradually filled up, and the streams no longer to be seen. Cities, towns, and markets have also risen, flourished, and disappeared." Although nothing so desolating as these calamities threatens the great emporium of foreign and native commerce at the port of Shanghai, yet the rapid silting up of sediment on the Woosung bar, at the entrance to the main channel, will, ere long, become so shallow that ocean steamers may not be able to cross it even at high spring tides, unless dredging operations be vigorously prosecuted. This is the practical part of our subject, which commends itself to the consideration of all persons interested in the trade of that port, which last year exceeded, in exports and imports, thirty millions sterling. The topic has been recently brought before the foreign consuls and other residents at Shanghai, through the columns of the *North China Herald* and other local newspapers, where it has been freely discussed; while the British and other officials in the settlements have represented and brought before the Chinese authorities, who are the conservators of the river, the urgency of taking active measures to prevent the threatened danger to its navigation. To these solicitations they have lent a deaf ear, and, though deriving a revenue of nearly two millions sterling from duties on foreign merchandise, they do not seem inclined to spend any money on the purchase of dredging machines, or otherwise assist in clearing away the silt to deepen the water on the bar. The chairman and members of the consular body at Shanghai have not been idle, and, in order to ascertain the extent of the growing obstruction, with estimates for the cost of removing and preventing further encroachments, they requested two eminent Dutch engineers, named G. A. Escher and Johs. de Ryke, specially skilled in this branch of hydraulics, to examine the estuary of the Yangtsze, which they have done effectually, and produced an elaborate report, with diagrams, which is now before us.

The leading object of the survey and report was "An Enquiry into the Present State of the Estuary of of the Yangtsze Kiang, more especially with regard to its bearing upon the Navigation to and from Shanghai." Then Mr. de Ryke goes on to state that, "Last summer, Mr. Escher and I accepted the invitation of the Board of Consuls at Shanghai to draw up

a report upon the 'Inner Bar of the Wongpu or Woosung River,' and to make a plan for improving that part of the fairway." On Gordon's plan this channel is named the Hwang-pu, without being designated a river, and we think that it has not the hydrographical features of ordinary rivers. It partakes more of the nature of a creek, or inlet from the sea, inasmuch as the tide has, probably, more influence on its waters than the outward current. Be that as it may, it is an exceptional stream that its sluggish waters should be so rapidly narrowed and shoaled, as shown in this report; wherein it is stated that the capacity of its waters "is chiefly dependent upon the rise of tide at its mouth, for this is by far its largest power. If that be the case, then there cannot be sufficient "scouring out" of sediment to prevent its continually "silting up;" and, consequently, what was supposed to be "a broad, deep river," as stated by Dr. Bridgman, in 1847, shortly after the foreign settlement was founded on its western bank, turns out to be nothing more than a semi-lake channel, which is rapidly dwindling into a narrow creek or natural canal, suitable only for vessels of light draught, or flat-bottomed junks. This would be nothing new, if we may trust the Chinese historians of the Delta, who state that the departmental city of Soonkiang, with eight districts, one of which is that of Shanghai, was formerly a great seaport on the Upper Hwang-pu, but now it has only a narrow boat channel of 2 miles to the lagoon stream.

On this important subject, which materially affects British and other foreign interests at the port, we cannot do better than give an extract from the *North China Herald*, as follows:—"No one who has been in the habit of passing occasionally along the Bund (the Marine Parade at Shanghai) can have failed to notice the narrowing of the river channel which has taken place during the last ten years; but the change is so gradual that its full extent can hardly be realised without comparing charts of the two periods. We have had an opportunity of examining two maps of the river, one made in 1866 and the other in 1875; and the results disclosed are so startling that, if they can be brought home to the Chinese comprehension, it would seem impossible that they should any longer neglect the river, unless they wilfully choose to let Shanghai die out as a port, and subside into the condition of Soonkiang and Quinsan, which tradition speaks of having been ports themselves at no very remote period. In 1866 the width of the channel at low water, between Pootung Point and the Peking Road Jetty, was 1820 feet; in 1875 it was only 1250 feet; and it has since (June 1877) still further narrowed; and not only has the river thus narrowed by one-third, but it has decreased in depth at the same time, the deepest soundings between these points being now only 83 feet, against 95 feet twelve years ago. It would be difficult to prove more clearly than by these simple figures how urgently the channel needs not only conservation, but artificial aid, if Shanghai is to remain a port. If 'scour' were to be depended upon in the Hwang-pu, if the downward current had any appreciable force, the narrowing of the channel would have been accompanied by a deepening; the water would have had either to make more room for itself by cutting deeper, or would have overflowed. But neither contingency has happened; and the fact is made clear that the downward current is of the most feeble character, and the river little better than an elongation of the lakes with which it is connected. The strong currents are simply caused by the flow and ebb of the tide; and in the interval between these there is scarcely any perceptible movement."

The Dutch engineer's report treats in detail, with numerous diagrams, of the methods to be adopted in constructing artificial dykes, and other means to remedy the serious drawbacks to the navigation of the port, both outside and inside the bar at Woosung. It is not the purport of our paper to comment upon these; but as the question of dredging has been a matter of controversy, not to say contention, between the Chinese Government and the foreign consuls, it is worth while looking at it in an impartial light. The former object to spend money on dredging machines and their maintenance, because they consider it would be throwing it away in the face of the natural obstacles to contend with; at the same time that the shallowing of the channel would scarcely affect the flat-bottomed junk traffic. So far, they are supported in these views by the Dutch engineers, who state that to dredge the outer channel would be ineffectual, as the operations would be useless after a heavy storm. However, this might not be the case in dredging the bar at Woosung. Be that as it may, if the channel up to Shanghai, which is about 14 miles, is filling so rapidly, as shown by the *North China Herald*, then the dredging operations would require to be carried throughout that distance to be effectual, and, of course, the cost would be proportionately greater. But if the residents are not able to induce the Chinese authorities to bring deep water for their ocean steamers to the settlements, there is a prospect of reversing the operation, by taking the settlements to the deep water at Woosung. The distance is about 10 miles, and an experimental railway has been laid down, which brings it within half-an-hour of old Shanghai. On the eligible site at the village within view of the Yangtsze estuary and the sea itself, a new settlement might be formed, and the ancient name revived of *Hai Shang*, "Upon the Sea," and likely to be so for centuries, if not for all time.

In concluding this sketch of the Yangtsze Delta, we have not touched upon that portion of it to the southward of Gordon's plan, simply because the available data is not to be relied on. For similar reasons, and also for want of space, we have not given any account of the island of Tsung Ming, forming a considerable part of the true delta, or tongue in the middle of the estuary, and the great section on its northern shore, where the alluvial lands of this "Child of the Ocean"—as the people fondly name it—join those of the *Hwang Ho*, or Yellow River; which the Emperor Kienlung designated "China's Sorrow," from the vagaries of its erratic channel and embouchure. Estimating the extent of the whole area of the delta north and south of the river at double that of the country surveyed by Gordon, or say, 10,000 square miles, this would make it more than one-fourth the superficies of the Province of Kiang-soo, which has been computed at 39,150 square miles, where a population of 37,843,500 existed previous to its decimation by the Taiping Rebellion. Probably no territory in the world, of similar extent, is better watered than

this province for agricultural purposes, with greater fertility of soil, cultivated to the highest degree by skilful labourers, who have made it the "Garden of the Provinces," and the Yangtsze Kiang the "Girdle of China." SAMUEL MOSSMAN.

A DESCRIPTION OF THE ISLAND OF FORMOSA.

WITH SOME REMARKS ON ITS PAST HISTORY, ITS PRESENT CONDITION, AND ITS FUTURE PROSPECTS.

IT is only a very few years since the Island of Formosa, or Taiwan, as it is called by the Chinese, was practically an unknown land, and even now the number of Europeans who have penetrated into the interior is very small.

In April 1877, business took me to the island, and during my stay I visited all the treaty ports, and journeyed overland from Taiwan-fu to Kelung, a distance by road of 218 miles.

My business gave me the *entrée* of the Governor's Yamen, and required that I should collect as much information as possible, from observation and from reports, as well as from interviews with those acquainted with the country. Although I did not penetrate into the savage district, and cannot therefore describe any previously unknown land, still I believe that much of the information contained in the following pages has never been published, and I have no doubt will be found useful by any one wishing to visit the island, or to make himself acquainted with its present condition or future prospects.

Formosa is an island about 240 English statute miles long and 90 miles wide, lying between N. lat. 22° and 25° 20′, and about 120 miles distant from the coast of China.

The Chinese had a knowledge of the existence of the island at a very early date, but they do not appear to have become really acquainted with it until the year 1430, when some junks were driven there by stress of weather. It is probable that most of the very early Chinese settlers were shipwrecked sailors.

About the year 1622, the Dutch settled in the Pescadores, a group of small islands lying about 30 miles to the west of Formosa. In 1624, at the instance of the Chinese, they removed to Formosa, and there built Fort Zelandia, the ruins of which still exist near Taiwan-fu.

In 1626, the Spaniards built a fort at Kelung, but the Dutch drove them out, and, to make themselves more secure in the north of the island, they built a fort at Tamsui, part of which now forms the office of the British Consulate.

In 1644, the Manchu Tatars gained Pekin, and very soon afterwards became rulers of the greater portion of China, and, in order to escape from the conquerers, 25,000 Chinese emigrated to Formosa.

In 1662, a pirate chief called Koxinga, at the head of a force of Chinamen, drove out the Dutch and became ruler of the island; and in 1682 Formosa passed into the hands of the Imperial Government of China, and it has ever since remained part of the Chinese province of Tokien.

Although nominally a part of China, the sovereignty of the Chinese only extends over about half the island; over certain other parts they exercise a nominal sway, but there are still some portions into which no Chinaman dares to enter.

Formosa has not been without its troubles. In 1782 it suffered from a disastrous inundation, and in 1788 there was a serious rebellion. Again, in 1832 to 1833, there was a rebellion caused by the oppression of the Chinese officials. The horrors of this rebellion were aggravated by the fact that the various clans of Chinese who had emigrated to Formosa from different parts of China, took this opportunity of fighting with each other. This division of the camp, however, enabled the authorities eventually to quell the insurrection.

Up to much more recent times the island was noted principally as a place where a shipwrecked crew were sure to be murdered, and likely to be eaten. Although the Chinese inhabitants were never accused of being cannibals, they were quite as desperate wreckers as the natives.

One of the most noted cases was that of the British brig 'Ann,' wrecked on the coast of the Tamsui district on the 11th March 1842. The crew and one passenger, fifty-seven in all, reached the shore, and tried to get away in two junks. The people on shore, however, would not allow this, and took them all prisoners. They were stripped naked and put in prison. They were soon marched to Taiwan-fu, having no clothing with the exception of a few articles given them by the more kind-hearted of the Chinese. Here they were imprisoned in a granary. On 13th August forty-four of them were taken to the execution ground, and forty-three beheaded. One man, having obtained a little money, had bought some drink and became intoxicated. He stood on his head before the magistrate and muttered some words he had heard used in a joss-house. He then performed some acrobatic feats, and the magistrate said he was a good man, and should not be beheaded. He was afterwards liberated, with seven others, and arrived in Amoy on 24th November 1842. One other was sent to Hong Kong, where he arrived 2nd April, 1843; two died on the day of the wreck; two died in prison; and one escaped. At the same time a large number of men from the 'Nerbudda' were murdered. The total number of British subjects beheaded, including those from the 'Ann,' was 197.

On the matter being investigated, it appeared that the Chinese officials in Formosa represented to the authorities at Pekin that these ships were war vessels, and had been captured after a severe battle; and not only did the Central Government approve of beheading the prisoners, but the officials received promotion. When the British Government found out the truth, the matter was brought before the notice of the Emperor, and a proclamation was issued degrading the Formosan officials, and ordering the principal ones to be brought before the Board of Punishment. It does not appear that anything further was done. From time to time, after this, wrecks took place on the Formosan coast, and, in each case, all or some of the crew were murdered.

In September 1850 the 'Larpent' was lost on the south coast, and only three of the crew escaped; some of the remainder being drowned, and the others murdered.

In 1851, when a Chinaman was sent to Formosa to search for any sailors who might be in captivity, he was shown a warrant for the arrest of all foreigners, and of all Chinese in the service of foreigners, who were found on the island.

Matters remained in this position till 1858, when Taiwan-fu was opened to foreign trade by the British, French, and United States treaties, and Tamsui by the French treaty in the same year.

In 1863 Takao was opened as a dependency of Taiwan-fu, and Kelung as a dependency of Tamsui, by provisional Customs regulations.

The principal Customs Office in the north of the island is at Tamsui; but in the south of the Island it is at Takao, the office at Taiwan-fu being subordinate to it.

British Consuls were first appointed to Formosan ports in 1862. The trade of the island was so small that in 1868 it was proposed to take them away, and so save the expense of the consular establishment. The merchants, however, protested, and explained that the trade was small only because it was not developed, and that, after leading them to suppose that consuls would be stationed permanently, and so inducing them to invest capital in Formosan trade, it was most unfair to remove them while the trade was promising to increase. As late as 1871, reference is made in the consular reports to the great excitement the proposal had occasioned. Trade has now increased to such an extraordinary extent that there is no chance of the proposal being repeated.

Even subsequent to the appointment of British consuls, the natives were in the habit of murdering the crews of any vessels wrecked on their coast. The crew of the U.S. vessel 'Rover' met with this fate, and the U.S. consul at Amoy, of whose district Formosa formed a part, seeing that it was useless at that time to negotiate with the Chinese authorities, who were powerless, determined to go direct to the savages.

On the 15th October, 1867, this gentleman, General Le Gendre, made a treaty with Tok-e-Tok, the chief of the savage tribe inhabiting the southern portion of the island. This chief undertook, on behalf of his tribe, to abstain from molesting strangers, and promised to supply them with water and provisions, if necessary; and the Chinese of the district undertook that if any stranger fell a victim, they would search out the guilty parties and punish them. This treaty, although not entirely successful, has had most beneficial effects. Several sailors wrecked since then, on the southern coast, have been sent to foreign settlements.

General Le Gendre was one of the first who did anything towards the topography of the interior of the island.

Some few years ago, some inhabitants of the Lew Chew Islands, over which the Japanese claim sovereignty, were murdered by the savages in Formosa. In order to avenge their death, and to prevent a repetition of such barbarities, the Japanese sent an expedition, in 1874, to punish the culprits. The Chinese disclaimed responsibility; and when, in consequence of this the Japanese landed their troops, the Chinese were pleased and saluted them. After some time, however, they became uneasy, and tried to drive out the Japanese; and failing in this, tried to make some compromise. Eventually, through the medium of Mr. (now Sir T.) Wade, it was arranged, on 6th November, 1874, that the Chinese should pay 100,000 taels, as compensation to the families of the Japanese subjects who had been killed, and 400,000 taels for roads made by the Japanese soldiers —in all, 500,000 taels.* It was agreed that all the Japanese should leave the island before 20th December, 1874. For the part Sir T. Wade took in these negotiations he received the thanks of the British, Chinese, and Japanese Governments.

In 1862 a Spanish vessel was wrecked on the coast, and the cargo was plundered. The Spaniards are now making a claim for compensation. As negotiations are still proceeding, all the facts have not been made public; but as far as one can judge, the demand seems to be a most preposterous one, as the portion of the island where the vessel was wrecked was, at the time, in open insurrection, and all the officials have been punished; and if the claim was to have been made at all, it should not have been delayed fifteen years.

Much interesting information respecting Formosa may be obtained in the Chinese repository, in a work on the Treaty Ports, by Mr. Mayers, and in the account of a cruise by H.M.S. 'Dwarf,' by Captain Bax.

Having now given an outline of the history of Formosa, it will be convenient to give some account of the Treaty Ports and a few of the more important cities, before proceeding to speak of the present condition and future prospects of the island.

One of the ports first opened to foreigners was Taiwan-fu, the capital of the island. This is a large city, situated about 3 miles from the coast. It contains over 120,000 inhabitants. The walls are about 20 feet high, 12 feet wide, and 6 miles in circuit. Until lately they were in a very wretched condition, but they have now been repaired. Taiwan-fu is the seat of Government of the island. The Taotai of this city is said to have the power of life and death, which is possessed by no other Taotai in China. The port of Taiwan-fu is Amping. This is a small village, situated close to the ruins of the old Dutch fort, Zelandia, the greater part of it being built of bricks from the old walls of the fort. There are barracks here for a considerable number of troops. A new fort has been built in the neighbourhood, armed with heavy breech-loading guns; this fort, unfortunately, I was unable to visit. The custom-house and one foreign-office are situated at Amping, but the foreign hongs are at Taiwan-fu. A creek runs up to Taiwan-fu, so that cargo boats can go right up to the city at high tide. The land between Taiwan-fu and Amping is a mud flat, below the level of extreme high water. This flat is divided into squares by embankments, and there is an embanked road all the way. At certain seasons the sea is admitted to this flat, and allowed to evaporate, for the purpose of collecting the salt. The manufacture of salt is a Government monopoly, and smuggling salt is punishable by the heaviest penalties. The salt supplied in Formosa is wretched, being of a dark grey colour.

* There are many different taels in China, and the values of them, compared with English money, are constantly varying. For rough calculations, three Hai Kwan Custom House taels are taken equal to 1/.

The harbour, if such it may be called, is only an open roadstead. Vessels anchor in 5 or 6 fathoms 2 miles from the shore. During the N.E. monsoon, *i.e.* from December to March, the roadstead is tolerably well sheltered, and even during November and April there is little to fear. During the S.W. monsoon, however, it is very dangerous.

Close to Amping there is a little deep water; but there is a bar with only 2 or 3 feet of water, and, with the slightest sea, the surf begins to break on it, so that there are often days during which no communication can be held between the shore and the ships. All the trade, consequently, is carried on during the five winter months. Cargo is carried in large boats, but passengers are taken in catamarans. A catamaran consists of twelve bamboos, placed side by side, lashed together with rattans, and small bamboos laid across; two bamboos are lashed a little higher than the others, and to these rowlocks are attached; a square block of wood is lashed near the middle, into which a mast can be stepped. Each catamaran is managed by three men, who row standing, and facing the bow. These catamarans are very safe, and rarely upset on the bar; but they do not venture out in the worst weather. The water, of course, surges up and down between the bamboos, and, in order to keep passengers dry, a tub is lashed on, large enough to hold two people. Fishermen proceed many miles to sea on these apparently frail rafts.

The chief export from Taiwan-fu is sugar. This is grown all over the plain of Formosa, and is crushed in the rude mills of the country. The mill consists of two nearly smooth stone rollers, about 3 feet diam. and $3\frac{1}{2}$ feet high, set vertical and geared together. To the axle of one a long lever is attached, to which two buffaloes are yoked. The cam is fed by hand, and the juice runs through a pipe to a building close by, where it is boiled, passing through from three to six pans, according to the ideas of the owner. The resulting sugar is somewhat dark-coloured, and contains a large quantity of lime, too much being added during manufacture. It is packed in baskets, containing about 2 cwt., and sent to Amping, where it is weighed and re-packed in bags, tied with rattans, each bag containing 1 picul, or $133\frac{1}{3}$ lbs. The cane in Formosa is passed twice through the rollers, and each mill crushes enough cane to give, on an average, 15 cwt. of sugar per day.

Another article of export at Taiwan-fu is rattan canes. These grow in large quantities in the island, and are very long and strong, but of a bad colour. They are not considered good enough for putting round tea-boxes, although they are used for sugar-bags. Light-coloured rattans are, therefore, imported from the Straits of Malacca, while dark-coloured and, therefore, cheaper canes are exported to the same place.

About 27 miles to the south of Taiwan-fu lies the port of Takao. Although this port was, as already stated, opened as a dependency of Taiwan-fu, it is now the head-quarters of the Customs staff. The harbour is better than that of Taiwan-fu (indeed, it could hardly be worse); but, as the latter is the capital of the island, ships go there in preference to Takao, when they have a choice. The harbour of Takao consists of a large lagoon, 2 miles long, and 1 to 2 miles wide. The area of water available for large ships is small; indeed, there is hardly room to swing in 3 fathoms, but one or two vessels may lie moored stern and stern. There is a considerable area of 12 feet water. The harbour is capable of improvement. The expense would of course be considerable, as is the case in all harbour works; but the improvement, if properly carried out, would be lasting.

The entrance to the harbour is only 200 feet wide, between steep rocks. The water in the entrance is deep, but outside there is a bar, with 7 to 9 feet water in the centre, and 10 feet at the ends. Large vessels do not, as a rule, come into the harbour, but lie outside, where there is good anchorage in the N.E. monsoon; but the roadstead is dangerous in summer. Immediately to the north of the entrance, Ape Hill is situated. This is a conical hill of coraline stone, 1100 feet high. A good many apes are to be found on it. In the neighbourhood of Takao there are plenty of snipe, but not much other game. The articles of export from Takao are the same as from Taiwan-fu, but less in quantity. In the Customs reports the two ports are treated as one. Lately the British Consul was stationed at Takao; but it is proposed, for the future, that he should live at Taiwan-fu.

In the north of the island the principal port is Tamsui. The real name of the port is Howei, or Hobay, Tamsui being the name of the district of which Teukcham is the principal city. Now, however, the port is known to the Chinese by the name of Tamsui. At the entrance to the harbour there is a bar a mile wide, with only seven or eight feet at low water; vessels, therefore, can only enter at high tide. Inside there is room for several vessels in 12 feet or 15 feet water. The harbour is, on the whole, a good one for its size.

Tamsui is the head-quarters of the Consular and Customs establishments for the north of Formosa. The British Consular offices are situated in the remains of the old Dutch fort, which have been repaired and fitted up for the purpose. About 12 miles up the river is situated the city of Banka, or Meng-ka.

Banka is the largest town in the north of the island, and contains 30,000 inhabitants. Here all the trade of the district is centred. All the merchants interested in the export of tea or camphor, or in the import of opium or piece goods, live in Banka.

Although the foreign settlement is at Tamsui, at the mouth of the river, the British merchants have found it necessary to establish a subsidiary settlement at a place called Twa-ta-tia, about a mile from Banka. Here they have hongs (or combined dwelling houses and offices) and godowns (or warehouses), where tea and camphor are stored, ready to be sent off in cargo-boats, for shipment at Tamsui.

No boat drawing more than 2 feet can go as high as Twa-ta-tia at low water, but there is some deeper water at Banka, and junks go there at high tide. They often ground, however, at low water. The principal articles of export at Tamsui are tea and camphor in foreign ships, and indigo and rice in junks.

Contrary to the practice on the mainland of China, almost all the tea is sold to the foreign merchants, after it has been sun-dried only. The growers sell direct to the foreigners, in small lots, and the taster, after judging of the qualities, mixes those which he considers to be of the same description, and so forms

one chop. On the mainland the tea is bought up in small quantities from the growers by Chinese dealers, who fire and mix the tea before selling it to the foreign merchants.

After the Formosan tea has been bought by the foreign merchant, it is fired under foreign supervision. This is done over holes lined with brickwork and filled with charcoal. After the charcoal has burned down, it is covered with ashes, and remains hot for many days. The tea is placed in baskets over the holes, and remains there three or four hours. The firemen are Chinese, who come over from the mainland for the season. The number who come yearly is now over 2000, and is rapidly increasing. The Chinese merchants are anxious to get the firing into their own hands, and are making a hard struggle for it. According to the reports of the customs officials, they have a good chance. Most of the tea is of the description known as Oolong, and goes to the American market.

The construction of tea-boxes is an industry of considerable importance. The wood comes from Foochow, ready cut to size, but the boxes are put together, covered with paper, and lined with lead in Twa-ta-tia. In 1875 300 tons of lead were imported, the whole of which was used for lining tea and camphor-boxes. The tea is packed in chests, half chests, quarter chests, &c. A chest weighs 105 pounds, and contains 90 pounds of tea.

Next in importance to tea comes camphor. This is obtained from the camphor trees near Tokoham. The root of the tree is cut into chips, from which the camphor is distilled. In most cases the remainder of the tree is allowed to lie and rot. In cases where there are any means of transport the tree is sawn into planks, 7 feet long, 2 feet broad, and 1½ to 3 feet thick. These are worth, at Tamsui, about 25c. per cubic foot. The thickness is gradually increasing, because the freight is usually so much per plank. After the camphor is distilled, it is packed in tubs containing about 4 cwt., and sent to Banka or Twa-ta-tia. It has the appearance of slightly dirty snow, and, in the winter of 1875 to 1876, some camphor, largely adulterated with this article, was bought by some Chinese merchants. On arrival at Twa-ta-tia camphor belonging to foreigners is pressed, with a loss of about 20 per cent. in weight. The water which runs from the press contains a certain amount of camphor oil, which is worth a small amount of money. Screw presses have been used up to the present time, but an hydraulic press is now being erected (April, 1877). The Chinese, having no means of pressing, ship the crude camphor in tubs to Hong Kong. The loss of weight in the passage is 30 per cent. The loss in the case of pressed camphor is very trifling, and as the loss in pressing consists chiefly of water, while the loss on the passage represents to a considerable extent a loss of camphor, the advantage of pressing is very great, not to speak of the saving of freight.

A small amount of sugar is exported from Tamsui, but the quantity is very trifling compared with that exported from the south of the island.

Within 8 or 10 miles of Tamsui there are large sulphur springs, which discharge a considerable quantity of sulphur. The incrustations round the springs are gathered and melted in large pans, something like sugar pans. The scum and the sediment are rejected, and the purer portion is ladled into wooden moulds. The blocks thus obtained are remitted in the same way, in order to obtain somewhat purer blocks. The resulting blocks are of a tolerably good colour, but the whole process is very rude, and while it gets rid of a certain amount of impurities, it introduces some others. The system is less wasteful, but less effective, than the Sicilian method of burning in large heaps or calcarone, and much inferior to the processes employed at a few of the best-managed Sicilian mines. The sulphur is worked by the Government solely for the purpose of powder manufacture, and there is little probability of their ever allowing it to be worked for any other purpose, or by any other persons.

Near Tamsui there are some flour mills, the machinery of which is turned by water-wheels. The usual power used for this purpose in China is either manual labour or bullocks.

The neighbourhood of Banka is the chief tea-producing district in Formosa. Tea is grown on the slopes of the hills in small patches. The scenery is very picturesque. The hills are not very high, and the valleys are small, and there is an utter absence of the grandeur of other parts of the island; but the woods and the varied cultivation have a pleasing effect. On the level ground little is grown but rice. This crop requires a great deal of water, and it is a great advantage to get a stream at a sufficiently high level to irrigate the land by gravitation. There is one plain near Banka of 30 or 40 square miles in area, which is irrigated by water from the hills, which are situated at a considerable distance. This water is carried across the river about 4 miles above Banka by an aqueduct. The supply is said never to fail.

Although in this district, as well as in other parts of Formosa, water at a high level is often available, still it not unfrequently happens that more or less extensive areas have to be irrigated from streams below the level of the ground to be flooded. In such cases different expedients are adopted, according to circumstances. The commonest method is the use of a form of chain pump—a trough open along the top is laid at an inclination of about 1 in 2. A wooden endless chain, with paddles attached to fit the trough, is passed over axles at top and bottom of the trough. The bottom of the trough dips into the stream or pool, while the top overhangs the irrigation ditch. The top axle is made to revolve, so as to make the chain with the paddles attached draw the water up the trough. The loss of power through leakage is not very great. The top axle is made to revolve in one of three ways—by cranks turned by hand, by an arrangement like a treadmill turned by the feet, or by a bullock turning a horizontal wheel geared into the axle.

When the water is to be raised from a running stream, advantage is taken of the power of the stream in a very ingenious manner. A large-framed wheel of bamboo is arranged so as to dip into the stream, the current of which makes it revolve. On the rim of the wheel, pieces of bamboo are fixed at a slight angle, each of these is filled with water as it passes through the stream, and as it comes to the top it discharges the water into a trough, which leads to the irrigating canal. These wheels seem to require very little attention. Advantage is also taken of running

water to obtain power for hulling rice. This is generally done by hand power or foot power, and is very hard work. Where a stream is available, the hammer is arranged with a bucket at the end of the handle. A small stream of water is brought so as to discharge into this bucket. The handle of the hammer being hung on an axle, the weight of water in the bucket lowers the bucket and raises the hammer, but during this operation the water is discharged and the hammer falls on the rice placed below in a stone bowl.

The Formosans do not appear to make use of the method of raising water in buckets so common in the north of China. A small pool is made, into which the supply of water is led as close as possible to the irrigation canal, *i.e.* the lift is made as nearly vertical as possible. Two men stand at the high level, one on each side of the pool. They have a bucket generally made of close-plaited wicker work, which each holds by two strings, one attached to the rim and one to the bottom. The bucket is lowered to the water, the bottom strings being slightly pulled so as to cant the bucket and fill it with water. It is then lifted by the top strings, and just as it reaches the high level the bottom strings are pulled tight so as to turn the water out. This operation is performed with a quickness which is perfectly astounding.

About halfway between Tamsui and Banka, a river called the Kelung River runs into the Tamsui River. All along the upper portion of this river, as well as on the banks of the upper part of the Tamsui River, there are coal mines worked in a very primitive method by the Chinese; of these more will be said in speaking of Kelung.

A considerable quantity of coal is brought down to Tamsui for supplying the steamers which call at that port, but none is taken there for export.

A few miles up the Kelung River is situated the village of Sak-kow. In 1872 there was a stone there (and, though I did not see it, I believe it still exists), on which there is an inscription to the effect that coal mining is illegal. The change in the views of the mandarins since its erection is very remarkable.. The road between Banka and Kelung follows the valley of the Kelung River. This river has numerous rapids, but it is navigable for boats drawing 1 foot or 18 inches of water. Travellers going from Kelung to Banka generally go in boats, if possible, as it is much quieter and less fatiguing than going by road; but going in the other direction, much time is saved by adopting the road instead of the river. Coming down the river, the boat shoots the rapids; but going up, a pole is lashed across it, and three or four men wade in the stream and push against the pole. At about 20 miles from Banka the river passes within about 3 miles of Kelung, A ridge of hills lies between the river and the village. The road over is very steep, but the height of the summit of the pass is not more than 270 feet.

The last of the treaty ports to be described is Kelung. This is the most northerly of the open ports, and its harbour is the best in the island. It is, however, very small, there being room for only one or two vessels to swing. There is no bar, and there are 7 to 16 fathoms in the entrance, and 4 to 6 inside.

The Junk harbour is of considerable extent, and is close to the village. It is very shallow. It has been ruined by vessels discharging ballast into it. This practice is now forbidden, but it is not altogether stopped. The harbour is well sheltered from all winds except the north. The entrance is marked by an island, called Kelung Island, 580 feet high, which forms a conspicuous object from the sea. There is deep water all round it. The harbour is very beautiful. Vegetation reaches to the water edge, and the hills are pretty wooded. There are numerous palms, and tree-ferns abound in the neighbourhood. There is a small island, called Palm Island, which shelters the harbour to a great extent. If a breakwater was built out from the western shore, opposite Palm Island, and some portions of the bay dredged, it would make the harbour a safe one in all weathers. This would cost money, but it would be a permanent improvement.

The rainfall at Kelung is large. In 1874 it amounted to 120 inches.

About 4 miles from Kelung there is a bay called Petaou Bay, or Coal Harbour. It derives the latter name from the fact of there being abundance of coal in the neighbourhood. It is a small but tolerably well-sheltered harbour. There is room for one or two small vessels, but there is no room for a large vessel to swing.

Between Kelung and Coal Harbour there are some very curious rocks, called the image rocks. These are comparatively soft rocks, with nodules of harder rocks imbedded in them. The sea has eaten away much of the soft rock, leaving the hard nodules projecting, and giving rise to most fantastic forms.

Coal has been worked in this district for a very long period by the Chinese. Their mines consist of little more than holes in the ground at the outcrop of the coal seam. The seam is followed as long as the mine can be kept dry. Arrangements are made for keeping the surface-water from running into the mine, and occasionally a wooden chain pump, like that used for irrigation, is employed to drain the mine, but it is practically correct to say that no pumping is employed, and wherever such is necessary the mine is abandoned. In one valley, near Kelung, there are said to be sixty such mines opened, and the number in the district is so great that 45,000 tons were shipped in foreign ships in 1873. This is the largest export as yet.

All vessels at present which come for coal lie in Kelung Harbour, the coal being carried to the water edge in baskets, and then shipped in cargo boats, which take it to the ship. Some of the coal has to be carried over the hills. Many children are employed in this work, which appears to be very hard.

Some time ago the provincial authorities determined to sink some pits and work the coal under foreign supervision. They engaged an English mining engineer, a Mr. Tyzac, who spent great part of 1875 in examining the district. Having determined on the proper course of procedure, he returned to England, and in May 1876, he despatched a party of eleven men, consisting of sinkers, miners, engineers, carpenters, and a blacksmith. All these were picked men, capable of superintending work in their several departments. A full supply of winding and pumping machinery, and everything necessary to start the work fairly, was sent out at the same time.

In April 1877, a shaft 250 feet deep, and 12 feet 7 inches in diameter, had been sunk, and was then within 50 feet of a bed of coal 3 feet thick, lying at an inclination of 1 in 6. No water to speak of had

been met with. The pit is being lined with sandstone of good quality, and all the permanent work and materials appear to be of the best description. The guides for the cage are of the new pattern, viz. vignoles rails to run at one side only. To all appearance there is more risk of a cage catching with guides of this pattern than with the old-fashioned wooden guides, but those supplied are good heavy rails, and, if well fitted up, will no doubt work well.

The mine is situated about 1½ mile from the coast, at an elevation of 150 feet above the sea level. A temporary tramway has been laid to the shore. The engines and machinery are capable of lifting 700 tons per day. Native workmen have been employed as sinkers at 30 cents per shift of eight hours, and have turned out well. The natives have also been trained to blast in the quarries without the presence of foreigners.

The Kelung coal is highly bituminous, and rather soft. It is a good steaming coal, in the sense that if employed there is no difficulty in keeping up steam, but it burns very fast, and a large quantity is required for a given amount of work. It is, therefore, unsuitable for steamers going long voyages. The smoke is very dense, and this is a drawback; and it is no uncommon thing to see flames rising several feet out of the funnel of a steamer. It is probable that the coal raised from the pit will be better than that mined at the outcrop, and there is little doubt that there will be a ready sale for all that can be raised. When it was determined to work the coal under foreign superintendence, a proclamation was issued saying that it was not intended to interfere with the working of the present mines, provided they did not encroach on the space set apart for scientific working.

Until lately the export duty on coal was 0·7 H.K. taels, say 4s. 6d. per ton; it has now been reduced to 0·07 H.K. taels, or one-tenth of the old amount. Including some local charges, the total dues payable on coal for export do not exceed 7d. per ton, an amount which brings some return to the revenue, and does not interfere with the trade.

Near Kelung, clay ironstone is found, but of very inferior quality.

There is a memorial-stone in Kelung erected to the memory of those who perished at the wreck of the 'Laptek.' This was a very distressing occurrence. The 'Laptek,' a British vessel, ran on shore about 8 miles from Kelung in 1874. All attempts to get her off having failed, she was surrendered to the underwriters, and Mr. Greig, Lloyd's agent, went to take charge. A lieutenant and several men from H.B.M.S. 'Kestrel' went on board to assist in dismantling. The work went smoothly for a long time, all on board having a pleasant time of it; indeed, it was described by one who assisted as being more like a prolonged picnic than like work. When the work was nearly finished, on 17th July, a severe storm rose suddenly, and Mr. Greig, the lieutenant of the 'Kestrel,' and six men were drowned.

In addition to the Treaty ports there are several native ports, but there is not much known about them. One of the best is Saw-o Bay, on the east coast. This is a tolerably well-sheltered port, with fair anchorage. The village is inhabited by Chinese fishermen. Twelve miles to the north of Taiwan-fu is situated the port of Kok-si-kou. This is a good port; but there is no inducement for foreign vessels to go there, even if the port was opened.

The port of Heong San, near Teuk Cham, is sheltered by sandbanks, but the water is shallow.

The Treaty ports of Formosa are points of such special interest that it appeared advisable to devote considerable space to a description of them; but there are several other cities and towns in various parts of the island which deserve notice.

The island may be divided, either according to its physical character or according to its inhabitants; but, practically, it makes little difference which method is adopted, because, roughly speaking, the flat portion is civilised, while the mountainous portion is savage.

Immediately to the north of Taiwan-fu, the country is sandy and slightly undulating. By degrees, as one goes north, the soil becomes richer; but for 20 miles the land is very poor, and badly cultivated. After this it improves quickly, and, before Kagee is reached, the land through which the road passes becomes rich and highly cultivated, producing rice, sugar, sweet potato, beans, betel-nuts, bananas, &c.

Very great attention has been paid to irrigation from this point right up to the north of the island, wherever the ground is at all suited to it. In many places the water has to be pumped, but in most places it has been brought from the higher ground in embanked canals; and wherever there are streams at a sufficiently high level, they have been trained, and have had weirs built across them so as to suit them for irrigation. Some of these weirs are considerable works.

Kagee, called Chin-lo-san by the natives, is a walled city of considerable importance. Paper is manufactured in the district, and the city is a centre of trade for the surrounding country. About 20 miles south of Kagee there is a small volcano, which has been seen by the missionaries. There is flame, but no smoke, issuing from the crater.

North of Kagee there are several rivers intersecting the rich alluvial plain. The first of any importance is the Boekhe, which runs about 20 miles north of Kagee. The bed of the river is composed of sand and gravel. It is very small in dry weather, but in floods it is a swift and wide torrent. It overflows the adjacent country sometimes to the extent of 1 mile in width.

A short distance to the north of this there are three rivers, the Chu-a-khe, the Twa-sin-tsung-khe, and the Potau-a-khe. The description of the Boekhe applies exactly to these rivers, except as to width. The flood bed of the first is 1½ mile wide; of the second, half-a-mile, and of the third, 1¾ mile. Included in these widths there are banks of sand and gravel, which may not be covered during floods, but they are merely composed of *débris* washed down by the stream, and are liable to be carried away at any moment.

After passing the Potau-a-khe, the road passes through very rich and carefully-irrigated rice lands, until Chang-hwa is reached. This is the second city in the island; but almost all the trade is carried on with the coast ports, which are not open to foreigners. Not only is there no trade between Chang-hwa and Taiwan-fu in foreign hands, but, as far as I could discover, there is no trade in native hands. Chang-hwa is a walled city, of apparently 60,000 or 80,000 in-

habitants; and judging from its busy appearance, the trade which it has with the coast ports must be very large. Very good bricks and tiles are made in the vicinity.

A few miles south of Chang-hwa there are signs of the ancient beds of mountain torrents, large quantities of gravel having been washed down into the plain. North of Chang-hwa there is more rice ground, through which runs the River Toa-to-khe, and one or two smaller streams. The hills to the north of this river approach much nearer the coast than the hills further south, and the road which to the south runs entirely in the plain, occasionally runs some little distance up the hills. The lower portion of the hills are being gradually brought into cultivation, and large quantities of rice are grown, but I saw no sugar in this part of the island.

About 20 miles north of Chang-hwa runs the Tyka-khe. This appears to be the swiftest of the Formosan mountain torrents. In the dry season it consists of a number of small streams, winding through banks of large shingle. At the time I crossed, all but one of these could be forded, but some of them were so swift that it was unsafe for one man to cross alone. Judging from the size of the stones, the river must be very fierce in floods, and the width of the bed liable to floods is 2 miles. Immediately to the north is the town of Tyka. Most of the trade of this place is carried on with the coast, but a little is carried on with Banka and the northern ports. Very fine grass mats are made here. A small trade is done in the second quality, but the very finest do not get into the market. They are about 6 feet by 4 feet, and are nearly waterproof. Immediately to the north runs the Pang-le-khe. This is a collection of mountain streams, all crossing from one gorge in the mountains. The beds of all are constantly changing. The width from the most southerly stream to the most northern is about 5 miles, and all the land between is liable to floods. There is a piece of land in the middle about half-a-mile wide which is cultivated, but it is composed of *débris* brought down by the streams, and though it has not been covered lately, it is liable to be eaten away by the rivers and re-deposited in some other place. The stones in the river are not so large as in the Tyka River, but the stream is very rapid in floods. And these rivers which have been described form great obstacles to the internal trade of the island. Travellers are often stopped for days, and, occasionally, I believe, for weeks.

The rainy season in the north of the island is in winter; and near Taiwan-fu, in summer; consequently, any one making the through journey is liable to be stopped somewhere. The best time for travelling seems to be October and November, and again in April.

North of Tyka, many of the villages are fishing villages. The hills come near the coast, and the cultivated land is broken up. Twenty miles to the north of Tyka is Oulan, a walled city, on the banks of a river, navigable by junks drawing little water. Near Oulan there is a desert of shifting sand, but it is of small extent. About 20 miles further north, Teuk Cham is reached. This is a walled city, of at least 50,000 inhabitants, and is the seat of Government of the Northern Provinces. Bullock carts can go from Teuk Cham to near Tamsui, and also to the native port of Heong San, a distance of 4 miles.

The sugar grown near Teuk Cham is considered to be good, but most of it must be exported in junks. Teuk Cham is also noted for its oil, made from the pea nut. This oil is largely used all over China, and burns brilliantly. It is by many considered superior to Colza.

North of Teuk Cham the road passes over some high downs. Much of the land is uncultivated, but, where water can be obtained, there rice is grown.

About 20 miles to the north of Teuk Cham lies Tien-lick, a large town, and a distributing centre for the surrounding country. There is a very large carrying trade between this city and Banka. About 10 miles north, the highest point on the road is reached, at a village called Gu-lu-na, after which there is a rapid descent into the valley of the Tokoham River, at a village called Sin Ching. This village is noted for its rice or pith paper. This paper is cut from the pith of the *Aralia papyrifera*. The pith is cut round and round, and the paper is wetted and pressed flat. The paper is exported principally to Canton.

About 3 miles below Sin Ching the Tokoham River joins the Tamsui River near Banka, the neighbourhood of which has been already described.

JAMES MORRISON.

(To be continued.)

THE CROZET ISLANDS.

(SOUTH INDIAN OCEAN.)

CAPTAIN LINDESAY BRINE, R.N., has made the following interesting Report on the Crozet Islands, in lat. 37° 9′ S., and lon. 150° 57′ E., which he visited when in command of H.M.S. 'Wolverene' in 1876:—

"We left Simons Bay on 18th November, and proceeded to the south until we fell in with the prevailing westerly winds in latitude 38° south, longitude 18° east. We then steered straight for the Crozet Islands until we reached latitude 43° 26′ south, longitude 36° 10′ east, the islands then being 622 miles distant. We now entered a dense fog, which continued, with rare intervals of open sky, until the morning of the 30th, at which time we had nearly run our estimated distance.

"We were on the point of heaving to, to wait for the weather to clear, when a sudden lift of mist disclosed for a few minutes the west end of the Twelve Apostles about three miles off on the bow.

"This point of the island is remarkable for its lofty group of pinnacle rocks closely resembling the Needles. These, although attached by their base to the island, appeared when first seen like sharp, jagged peaks, arising separately from the sea, and it was the low morning light penetrating between the open spaces that caused them to stand out so clearly. The island itself was not visible. A high rolling sea broke heavily on the weather shore.

"At about 9 of the forenoon the fog again lifted, and I steamed in for the land, to examine the Twelve Apostles (the island on which the 'Strathmore' was wrecked), firing guns to attract attention.

"It was evident that no close observation could be made unless a change took place in the weather; but most fortunately the fog cleared away, and was succeeded by two singularly fine and calm days, and

we were thus able to examine the shores, bays, and hill slopes within a distance from which any people or signs of wreck could have been distinctly seen.

"A small cairn, raised by the survivors from the 'Strathmore,' still exists at a point on the ridge about 300 feet above the sea. A grassy plateau where they were encamped was covered with white albatrosses sitting on their nests, and the rocks were crowded with penguins. Seabirds of various kinds were numerous, attracted by a good stream of fresh water, which flows from the hill over the cliff into the sea.

"After completing the examination of the Twelve Apostles, I steamed across to Hog Island, and examined its leeward coast. Here, as at the Twelve Apostles, the valleys and hillsides were dotted with white albatrosses.

"The top of this island was covered with snow, and, although it was now the summer of these latitudes, large quantities of snow were still lying in the cleft of the rocks near the shore. The windward or west side of the Hog Island is precipitous and much exposed, and I did not see any places where wrecked people could settle, but upon its lee or eastern slope there were several fairly-sheltered positions, where the landing would not be difficult. The lower sides of the hills are covered with coarse grass. There are numerous birds and rabbits and several fresh-water streams.

"I now proceeded to Penguin Island, the southern extremity of the Crozet group. This is a bare precipitous rock about 4½ miles in circumference. I could not see any water here, and very few birds.

"This volcanic island appears to be destitute of any means of preserving life, and unfortunately it is, from its position, the most dangerous for vessels proceeding by a great circle route to Australia.

"The search round the shores of the Windward Islands occupied one day, and the next was employed in a similar manner examining the Eastern Islands.

"The first visited was Possession Island, the largest and most important of the group. When off Nairne Bay we observed on the beach a hut, several casks, and two boats, one of which seemed to be in fair condition. The sea being smooth and the wind light, I decided to anchor, and send in our boats to search the shore, as I thought it probable we should find some record left by people who might have gone there in the hope of meeting a sealing vessel.

"Upon landing, our attention was immediately excited by the strange sensation of finding ourselves surrounded by animals which evidently had not the slightest fear of men or their guns. Hundreds of seals, which were resting on the damp grass bordering on the stream, which at this point enters the sea, made no attempt to escape from us; the albatrosses, also, would not move from their nests on the ground. These magnificent birds, measuring in several instances 11 feet across the wings, only showed resistance when actually seized, and even then did not seem to have any sense of danger. The bay was alive with birds; we observed the white and sooty albatross, peterels of various kinds, black hens and cape pigeons, numerous gulls, and a few wild ducks, and the rocks were covered with seals and penguins.

"The hut was about 12 feet long, and contained six sleeping bunks; it was rudely constructed with staves of casks. There was a stove inside, on the right of the door, ingeniously made out of an old fish kettle; the funnel was formed by a series of small iron hoops, nailed together. There were a number of empty casks outside, together with other *débris* belonging to a sealing establishment. There were two whale boats hauled up on the beach. One of these was useless; the other, with some slight repairs, could be made seaworthy. The name, 'J. A. Brink,' was cut on the door of the hut. We found no document, or any signs of the bay having been lately visited. The following record was placed in a tin box, and secured to the stove in the hut:—'Her Brittannic Majesty's ship, 'Wolverene,' 17 guns, visited each island of the Crozet group, to ascertain if there were any shipwrecked people on them, and finally called at this bay on the 1st December 1876, on her way to Perth, Western Australia, from England.'

"We concluded our examination by steaming round and searching the steep and desolate shores of East Island, the last of the group.

"Soon after leaving the land, and while the Crozets were still visible, we passed close to a large iceberg, whose height was estimated at 300 feet, and the circumference at the water line about 3 miles.

"Judging from my experience, I would submit that merchants' vessels should be cautioned against going down to a higher latitude than the 44th parallel; in the stormy latitudes south of this the westerly gales propel a ship through the water at a great speed, and the seas are so high that it would be difficult to check the speed or haul to the wind to clear danger. The Crozets are in a known position and can be avoided by careful navigation, but this is not the case with icebergs; if one of these should happen to be floating in the line of course of a vessel going through the water at a rate of 12 or 13 knots during a fog by day or on a dark night, it would not be seen until it was too near to be avoided and destruction would be certain. Icebergs in these southern seas should be considered as representing rocks or shoals in unknown positions. Merchant ships rushing blindly through these dangers run most criminal risks, they play a daring game of chance at which the lives of the passengers and crews are hazarded. It is more than probable that the majority of the ships reported as missing in these seas are missing because wrecked by sudden and violent contact with drifting icebergs.

"In the event of people being cast away on the Crozets I would recommend that, if possible, they should establish a look-out place on the Twelve Apostles; this island is the one which would most probably be sighted by ships, and an object placed or a man standing on the ridge where the 'Strathmore' cairn is erected would be seen at a great distance.

"The north-east point of the Twelve Apostles is by the chart placed in longitude 50° 41′ east. Our chronometers placed the point in longitude 50° 36′ east. This is assuming the latitude to be correct, as no observations for latitude could be obtained. If our longitude is correct the Twelve Apostles should therefore be placed five miles west of their present position on the chart."

Reviews.

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SOME SCIENTIFIC RESULTS OF THE ARCTIC EXPEDITION.*

THE important scientific results of the Arctic Expedition are still being worked out, and will appear with the work of Sir George Nares. Captain Feilden is engaged upon the natural history, Staff-Commander Creak on the magnetic work, Lieutenant Egerton on the meteorology, while observations on currents, tides, and winds are being worked up by Sir George himself. But, in the meantime, a few instalments have been published. In our number for August 1877, we noticed Captain Feilden's interesting paper on the birds of the North Polar Basin. His paper on the mammalia of North Greenland and Grinnell Land is now before us.

Captain Feilden, who received cordial assistance from every officer in the Expedition, is confident that no species of mammal escaped their united observation.

In the present paper there is, first, a notice of each point where remains of Eskimo were discovered. The most northern position was close under Cape Beechey, about 6 miles south of the 82nd parallel. The traces here found are, indeed, the most northern vestiges of man. They consisted of the frame-work of a large wooden sledge, a stone lamp, and a snow scraper, made out of a walrus tusk. Cape Beechey is at the narrowest part of Robeson Channel, where it is not more than 13 miles across; and the 'Polaris' Expedition found traces of summer encampments a few miles to the south, on the opposite shore, near Cape Lupton. Captain Feilden, therefore, conjectures that this was the *Ultima Thule* of Eskimo advance, and the point of crossing the strait. Northwards from Cape Beechey no trace of man was discovered. This is three degrees north of the present extreme range of the Etah Eskimo, the most northern race of men known; and the traces, not only of wanderings, but of former permanent habitation, were found in places where, under present climatic conditions, it would be impossible for even the "Arctic Highlanders" now to exist.

All traces of man ceased before reaching the 82nd parallel. For the same reason no bears ever enter the Palæocrystic Sea through Robeson Channel. Captain Markham found the skull of a large bear in 82° 30′ N., but it was probably washed out of mud beds, which fill up the valleys of Grant Land, and may have been brought on the ice from any distance.

Commander Beaumont secured an ermine (*Mustela erminea*) during his sledge journey, in 82° 15′ N., and specimens were obtained in Grant Land as far north as 82° 30′ N., where it is hunted and killed by the Arctic fox. On the 1st of April, 1876 several wolves (*Canis lupus*) made their appearance in the neighbourhood of the winter quarters of the 'Alert,' following a small herd of musk oxen. They are larger than the largest of the Eskimo dogs, of a light grey colour, with long fur and drooping tail. At intervals the long, melancholy, but not unmusical wail of these wolves reverberated from the hills. On the 25th of May a solitary wolf appeared and followed Captain Feilden's sledge, for several days, but it was very cunning, and eluded all endeavours to get a shot at it. The foxes (*Vulpes lagopus*) were very scarce. There were occasional footprints, but no fox was seen until the 13th of July, when two were secured by Captain Feilden and Commander Parr, on a plateau 800 feet above the sea. They were both in summer garb, the hair on the back and brush being of a dirty rufous tinge. On further examination, the explorers found many dead lemmings and two ermines, as well as numerous *cachés* of dead lemmings, evidently made by the foxes; and obviously depôts for the winter. The increased vegetation (*Saxifraga, Stellaria, Draba, Potentilla*) induced by the presence of the foxes is the means of attracting and sustaining the lemmings in the immediate vicinity of the foxes' dens. The lemming (*Myodes torquatus*) was found in great abundance up to the extreme northern point of land attained in 83° N. Their southern range appears to be stopped by the great Humboldt glacier. Their food consists of buds of *Saxifraga oppositifolia* and other herbs, and they make nests of grass in the snow; but Captain Feilden is not of opinion that they hibernate. He gives a very interesting account of their habits, and of the formation of their claws. The hare (*Lepus glacialis*) was met with in small numbers, and Captain Markham found its footprints nearly 20 miles from the land, in 83° 10′ N.

Captain Feilden's remarks on the history and migrations of the musk ox (*Ovibos moschatus*) are extremely interesting. Only six were procured round the winter-quarters of the 'Alert,' and their range is confined to the coast-line and adjacent valleys. It is extraordinary how they obtain food during the long Arctic night; but it is certain that they remain on those desolate shores throughout the year, although the number in Grant Land is extremely limited. No reindeer were seen.

The ringed seal (*Phoca hispida*) is the only species met with north of Cape Union, and which penetrates into the Palæocrystic Sea. Lieutenant Aldrich saw one near Cape Joseph Henry, and Captain Feilden obtained another in September 1875. Three or four were also seen in the following June, and as it would have been impossible, owing to the closely-packed state of the ice, for any seal to have worked its way to the inlet where they were seen, Captain Feilden is satisfied that the *Phoca hispida* is resident throughout the year on this coast, in very small numbers. The stomach contained remains of crustaceans and annelids. The *Phoca barbata* was shot in Robeson Channel, but was not seen to the northward; and the walrus (*Trichechus rosmarus*) does not go north of the meeting of the Baffin Bay and Polar tides off Cape Fraser. No whale could inhabit the frozen sea to the north of

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* *The Mammalia of North Greenland and Grinnell Land.* By H. W. Feilden, F.R.G.S. (*Zoologist*, Aug. and Sept. 1877).

Recent or Living Mollusca brought home by the Naturalists of the Arctic Expedition. A list, by Edgar Smith. (*Annals and Mag. of Nat. Hist.*, Aug. 1877).

List of Crustacea collected by the Arctic Expedition. Mr. Myers. (*Annals and Mag. of Nat. Hist.*, July and Aug. 1877).

"*The Post-Tertiary Fossils procured by the late Arctic Expedition, with Notes on some of the Recent or Living Mollusca from the same Expedition.* By J. Gwyn Jeffreys, LL.D., F.R.S. (*Annals and Mag. of Nat. Hist.*, Sept. 1877).

Arctic Molluscan Fauna, by Captain Feilden, F.R.G.S. (*Zoologist*, Oct. 1877).

Robeson Channel. The mammals of the land bordering on the Palæocrystic Sea are :—

1. Ermine (*Mustela erminea*).
2. Wolf (*Canis lupus*).
3. Fox (*Vulpes lagopus*).
4. Lemming (*Myodes torquatus*).
5. Hare (*Lepus glacialis*).
6. Musk Ox (*Ovibos moschatus*).
7. Ringed Seal (*Phoca hispida*).

There are some remarks in the papers by Mr. Smith and Mr. Gwyn Jeffreys which require notice, as they may lead to erroneous notions respecting the biology of the Palæocrystic Sea. Mr. Smith says :—"It is somewhat disappointing, considering that unexplored regions were searched, that only a single new form was procured. The entire collection consists of thirty-four species. This may appear a very small number; but the difficulty experienced in collecting in such northern climates in a great measure accounts for such small results. It by no means proves that there is any great scarcity of molluscan life in the regions investigated. In all probability further research will discover many more known forms, thus showing that the fauna northward does not change very materially from that existing further south in Davis Strait." Dr. Gwyn Jeffreys writes :—"I cannot help sharing Mr. Smith's expression of disappointment with the conchological results of the Expedition. The number of post-tertiary as well as of recent species is very scanty. In analogous or apparently similar cases of so-called 'glacial' and raised sea-beds in Great Britain, Scandinavia, and Canada, which I have examined, I collected in two or three hours a greater number of fossil species than those procured in the Expedition."

Mr. Gwyn Jeffreys further says that marine animals, especially of the invertebrate kind, abound in the Polar Ocean as far north as it has been explored. He alludes, in proof of this, to Captain Markham having brought up a few crustaceans on a lead line in 83° 19′ N., and to ducks and geese flying towards the N.W. from the 'Alert's' winter-quarters, adding, "it must be recollected, that these ducks and geese subsist entirely on marine animals;" and he thus concludes: "I am therefore at a loss to know upon what grounds Sir Rutherford Alcock, the President of the Royal Geographical Society, stated in his address on the 28th of last May, as a fact, that animal marine life almost ceases to exist in the ice-covered Polar Sea, and the Palæocrystic Sea is a sea of solitude."

Sir Rutherford Alcock was delivering a general address on geographical subjects, and he alluded mainly to vertebrate life. His statement was perfectly accurate. With the exception of a snow bunting, which had strayed from the land, not a single living thing was seen on the Palæocrystic Sea outside the floebergs. Four seals (*Phoca hispida*) were seen in the bays on the coast, where they had remained throughout the year, and the ducks and geese, alluded to by Mr. Gwyn Jeffreys, were not flying north over the sea, but along the land. Their course was N.W. from the winter-quarters, simply because the land trended in that direction, but it afterwards trends S.W., and the real destination of the birds was south and not north. They do not subsist entirely on marine animals, but almost entirely on food obtained in fresh-water pools and lakes.

As Sir Rutherford Alcock correctly said, the Palæocrystic Sea is a sea of solitude. All traces of human beings cease before it is reached, at 81° 54′ N. There are no bears, no cetaceans, no seals—except the few individuals seen within the line of hummocks—no falcons, no birds, except close along the land. This total absence of the vertebrates is one proof that invertebrate life also becomes very scant in the frozen Polar Sea. But the proofs are cumulative, as will presently be shown.

Mr. Gwyn Jeffreys and Mr. Smith attribute the small number of species brought home to the difficulty in collecting in such northern climates. This is a mistake. The remarkable energy and perseverance of the collectors is proved by the great number of specimens (as distinguished from species) that was brought home, and the collectors were not, as is suggested, labouring under disadvantageous circumstances. It is true that the ice prevented dredging to any extent; but Captain Feilden and his colleagues had the great advantage of being able to examine recent sea beds extending from the present sea-margin to a height of no less than 1000 feet; and beds are being deposited at the present day under precisely the same physical conditions as those now elevated above the sea level. Thus the molluscan fauna of the past, represented by these post-tertiary deposits, is precisely that now existing in the adjacent sea. At least forty or fifty spots, where these beds occur, were carefully examined by independent observers, especially by Captain Feilden, Mr. Hart, Dr. Moss, Lieutenant Parr, and Lieutenant Egerton. The work of collecting the invertebrate fauna of the newly-discovered region was thus performed thoroughly and exhaustively. The sands and mud were also frequently submitted to microscopic investigation.

The results, as given in the *Zoologist* by Captain Feilden, are that four species of *Conchifera* were found to be very generally distributed as fossil forms, and in considerable numbers, namely, *Pecten Grœnlandicus*, *Astarte borealis*, *Saxicava rugosa*, and *Mya truncata*. The *Gastropoda* are excessively rare in a fossil form, and the dredgings showed that a similar disproportion existed in the number of individuals between the recent *Conchifera* and *Gastropoda*.

Thus the molluscan fauna was examined under very favourable circumstances, owing to these large deposits of recently-emerged sea-beds being laid open to the investigations of intelligent and most diligent collectors—the result showing a remarkable correspondence between their fauna and that of the neighbouring sea. The two combined show very accurately the present condition of the molluscan fauna from Smith Sound up to the 83rd parallel.

Such is one out of many valuable scientific results of this admirably-conducted and most successful Expedition.

Mr. Gwyn Jeffreys says that he has collected in the raised sea-beds of Great Britain, Scandinavia, and Canada, in two or three hours, a greater number of *species* (not specimens) than those procured in the Expedition. No doubt Captain Feilden has not unfrequently done the same; but neither Mr. Gwyn Jeffreys nor any other man living could have collected more carefully, or more successfully, than was done by the members of the Expedition at the sea-beds discovered by them. More species were not collected for the very obvious reason that they do not exist.

The reason of their absence is, of course, the

absence of suitable food, as Captain Feilden points out. The four species of *Conchifera* already mentioned as being numerous, subsist on diatoms, which are abundant in polar waters. A supply of suitable food is not forthcoming for the support of the *Siphonostomata*, and hence their absence. The Davis Strait tide is met by the colder tidal water from the north, at Cape Fraser, and this is an explanation of the fact that the more abundant Davis Strait fauna does not extend into the Palæocrystic Sea. The bottom temperature of the water in Davis Strait is from 34° to 36°, while the strong southerly glacial current which the Davis Strait tide meets off Cape Fraser has a temperature of 29°. The decrease of invertebrate animal life is shown by comparing the number of species of recent *mollusca* collected by different expeditions. The 'Valorous,' from 60° to 70° N. lat., obtained 122 species; the 'Assistance,' from 75° to 77° N., 45 species; Dr. Hayes, near the entrance of Smith Sound, 21 species; and the late Arctic Expedition, from 79° to 82° 30′, only 35 species. The facts conclusively prove that the collections made by the Arctic Expedition fairly represent the molluscan fauna from 79° to 83° N. Those collections reflect the highest credit on the accomplished naturalists and their zealous colleagues and fellow-workers, who, for the first time, have furnished us with a satisfactory knowledge of the fauna and flora of a hitherto unknown region. The notices that have hitherto appeared are, however, merely instalments of the rich and varied results of the Arctic Expedition which will shortly be published.

BARON RICHTHOFEN'S CHINA.*

THE appearance of the first volume of the work in which Baron Richthofen has recorded the results of his extensive researches in China, has created quite a sensation in the scientific world. No one certainly was better qualified to approach the task than one whom that high authority, Colonel Yule, has described as "a traveller who has not only trodden many hundreds of miles in the footsteps of Marco Polo, but has, perhaps, travelled over more of the interior of China than Marco ever did, and who carried to that survey high scientific attainments, of which the Venetian had not even a rudimentary conception."

Baron Richthofen returned to Europe in December 1872, after an absence of twelve years, four of which he had spent entirely in China and Japan, having traversed the former country from Canton to the southern verge of Mongolia, and from Shanghai to Ching-tu, and having personally visited fourteen out of the eighteen provinces into which the country is divided. The little that has hitherto been published respecting these journeys has appeared in some geographical journals (notably *Petermann's Mittheilungen*), in the shape of letters originally addressed by the Baron to the Shanghai Chamber of Commerce. These few letters, however, were important enough to show that Richthofen's researches had thrown an entirely new light on many points of considerable interest, such, for instance, as the coal deposits of Shan-si, the distribution and characteristics of the *loess* formation in North-west China, and the "red basin" in Sz-chuen. Up to the present time, Richthofen has come before us more as a geologist than ought else. Those who now take the book in hand will probably be led to expect a physical sketch of the one and a quarter million of square miles and upwards constituting China proper, since the title excludes all idea of a mere record of travel. The title is "Experiences of Travel and the Result of Researches based thereon;" but a glance at the work will show that it is not a mere description of the geology of China, with treatises on the economical features of the country, and the distribution of products. We must express our opinion that it is a record of researches in the most varied sense of the word, which combine to place the author in the first rank of geographers.

When we begin to examine the subject of Baron Richthofen's volume, we are struck with the want of a reliable work which could form a basis or introductory study to the present book, and which would enable a student to appreciate the true position of a country which owns one-quarter of the population of the entire globe. Geographical literature on the subject of Asia in general was still influenced by certain old theories from which even Carl Ritter, one of the foremost of the new school of geographers, was unable to emancipate it. We refer more especially to the division of the continent into Hither and Further Asia, or Eastern and Western Asia. Another peculiarity worthy of note is that in Ritter's work fourteen volumes are devoted to Iran, Asia Minor, Syria, and Arabia, while only six deal with Northern, Eastern, and Southern Asia. China appears here as a region of comparatively secondary interest, equivalent about to Asia Minor in importance, while, in reality, the two are wholly incomparable. Humboldt's work on Central Asia is another of acknowledged authority, but it is generally held that he has restricted his view of Central Asia too much to the region between the Altai and the Pamir, where he would locate his meridional Bolor Range, and that this knot or boss in the mountain regions of Asia bears a disproportionate relation to the general mass of the continent. Humboldt's work appeared in 1843, and the volumes of Ritter, with which we are concerned, in 1832-4. The axis of the continent has since then, thanks to the gradual exploration of the eastern lands, been placed by unanimous consent further eastward, and the older views of geographers have become obsolete, just as Buffon's school of zoology has had to give way to that of Cuvier.

Richthofen's opening chapter justifies us in ranking him as the Cuvier of geography, in reference to his description of the Asiatic system, for his exposition thereof differs materially from that of Humboldt. The true view of the Central Asian system, as contrasted with the periphery of the continent, can be realised from a consideration of it with reference to so important a portion as China. It is also an excellent feature of the work that these new theories on the continuity of the great Central Asian plateau from the Pamir to the Khingan Range are only indicated in their leading features, so that the author does

* *China. Ergebnisse eigener Reisen und darauf gegründeten Studien von Ferdinand Freiherrn von Richthofen. Erster Band. Einleitender Theil. Mit 29 Holzschnitten und 11 Karten.* Berlin, Verlag von Dietrich Reimer (London, Trübner & Co.), 1877.

not lose his point or the thread of his argument in side issues.

We can only touch but sparingly on the contents of the work. The characteristic feature of Central Asia is the great plateau, which the author describes as the former bed of a huge inland sea. He applies the Chinese name *Han-hai*, or dried-up sea, to the entire region, which has hitherto borne no common name in European geographical literature, but which has been called by the names of Eastern Turkistan, or the Tarim basin, in its western, and Gobi, Shamo, or Mongolia in its eastern portion. The Han-hai, with its enclosing ranges, forms one of the largest regions without any outlet to the sea in existence, and the author shows graphically what influence such conditions of land-formation exercise upon the inhabitants. The chief difference between those countries the drainage of which collects in rivers which reach the sea, and those where the drainage collects in inland lakes and evaporates, is that in the latter the *loess*-like particles left are unsuitable for agricultural operations, and that only nomads can find there a subsistence. These regions are also peculiarly exposed to the operation of the wind, which is an important geological agency. The author shows how the Tien-shan and Kuen-Lun Ranges help to contribute in this way towards the repletion of the intervening basin. The valleys are first filled up, and the levelling tendency of the wind causes the same steppe-like appearance in the depressions of the plateau, which are barely 2000 feet above the level of the sea, and on the ridges of the Kuen-Lun, which range between 15,000 and 20,000 feet in height. A chief feature of this region without outlet is a dry climate. Where great downpours occur, brooks unite, and form lakes, which at last burst their banks, when the downfall exceeds the loss by evaporation. Out of these are formed, first, isolated lakes, and then chains of lakes, which change into rivers, and so reach the sea. According to Baron Richthofen's view, in ancient times the salt-steppe in Central Asia was of much greater extent, and included all North-western China. A change in the climate has led to the formation of the Hoang-ho river system, and, in this wise, a land formerly devoted to nomadic pursuits has now been changed into one of great fertility. Into the appearance of this *loess* country, in Northern China, we do not propose to enter, as previous publications have enlarged on this topic. He gives, however, fresh proofs in support of his opinion, and illustrates the parts referred to by some excellent woodcuts.

But Richthofen does not dwell exclusively on these geological matters. When we speak of him as a geographer, we imply that for one thing he continually endeavours to consider the structure of the country with reference to the history of the people, their civilisation, emigration, and social and political movements. He shows very clearly that Dzungaria on the one hand, and the narrow pass of the Yumonn on the other, which lead towards Lan-chau-fu on the Hoang-ho, were the two gates by which the Steppe population migrated east and west. Caravan routes have been laid down with great exactness, both in old and in recent times, and Richthofen brings new proofs of the existence of such a one on the southern confines of the Tarim Basin, where discoveries of ruined cities have of late years been made.

To turn to the immediate scope of the book. The present volume contains 750 quarto pages, of which more than a third is taken up by the interesting introduction on Central Asia. The second part deals with the author's special subject, the "Development of Knowledge respecting China," without, however, this being enlarged beyond the limits of an introduction. A suspicion of prolixity might possibly here suggest itself, but such a notion would be quite erroneous. The author has perceived that, while there was no lack of excellent works on this subject, a comprehensive review of the abundant and scattered material, such as Ritter had attempted in 1832, was a real necessity. These he brings into prominence, more especially the Chinese sources of information which have come to light since that date. A chapter of 100 pages is devoted to the Yue-kung book, the oldest work on the geography of the Chinese Empire, and one held in repute since the earliest times for its accuracy and importance. In this and in the following chapters the author endeavours to develop the ground on which he bases his opinions (one of which is a belief in the trustworthiness of the Yue-kung) in a dispassionate and judicial spirit. Indeed, the strong scientific tone of the work throughout forms an excellent contrast to many geographical publications of the present day. Absolute completeness is, of course, unattainable, but certainly the number of books and pamphlets unnoticed is very small. We must in justice remark that, as this scientific matter is to be found chiefly in the notes, the thread of the general account of China is in no wise interrupted. This conducts us through the relations of China with the people of Central Asia (pp. 395-578), the arrival of the first Europeans in the Eastern kingdom in the Middle Ages, the first appearance of the Portuguese on the coast of the China Sea, the missions of the Jesuits, and the first despatch of embassies to Peking. This section ends with the approach of the modern period, the historical events of which are more or less within the recollection of most readers. First among these come the researches of scientific Europeans in China proper. And here a reflection pervading the whole work forces itself on one's attention, *i.e.* that the Chinese text books and other authorities are, as a rule, worthy of considerable reliance; and that these, through the misapprehension of European commentators, have been unfairly discredited hitherto. Indeed, ten years ago, we should have had a very indifferent map of China, if in the construction thereof we had had to renounce all Chinese maps. Richthofen considers them generally as reliable, and his great atlas of forty-four maps which he has in preparation is constructed chiefly from Chinese sources. The same remark applies equally to regions not belonging to China proper, such as (more especially) Tibet, the geography of which had recently been exhibited in a most confused fashion. He is strongly of opinion that until we have the results of new exploration before us, we are bound to stand by these Chinese sources of information. We may observe that Mr. Trelawney Saunders, in his careful map of the Himalayas and Tibet (see our number for July 1877), has shown his agreement with our author in this, in delineating the still unexplored tracts from the Lama Survey.

The eleven maps accompanying the first volume

are purely general maps, illustrating Baron Richthofen's views, and are not designed to afford a topographical illustration of his travels. The publication of the atlas referred to will therefore be looked forward to with eagerness, but as this will in all probability take some years of preparation, we would suggest the advisability of Baron Richthofen publishing, with his second volume, a preliminary general map on a larger scale and with more details, especially as there is a great need of a good general map of China. It is a matter of considerable difficulty to follow Richthofen's routes on any existing map, owing to the similarity of Chinese proper names, and the widely-different manner in which they are spelt.

In conclusion, we must express our admiration of the elegant manner in which the work has been turned out. The importance of the subject, and the excellent method of treatment, entitle it to the first rank among the scientific works of our day.

THE CRUISE OF THE 'MAGENTA.'*

THE cruise of the Italian corvette, 'Magenta,' round the globe belongs to a class of voyages which, with the gradually-lessening fresh fields of exploration, may be expected to take the place of those more stirring feats of discovery with which the pages of geographical history are illustrated. The gradual exhaustion of these unknown areas has of late years occasioned a diversion towards the more purely scientific side of geography, and the voyages of the 'Magenta,' the 'Novara,' the 'Challenger,' and others may be cited as one outcome of this movement.

We are reminded, however, in the work before us, that science was not the primary object in the equipment and despatch of the 'Magenta.' For some few years the Italian Ministry had been anxious to establish closer commercial relations with Japan and China, and in 1864 Signor Minghetti prepared to give effect to these wishes. Signor Cristofero Negri, of the Italian Foreign Office, was deputed to conduct the negotiations for a commercial treaty, and a scientific staff, qualified to report on the natural history of the countries visited, had been assembled together. At this juncture a change of Ministry supervened, and just as the retirement of the Gladstone Ministry, in 1874, broke off the preparations for our own Arctic Expedition, so did the fall of the Minghetti Cabinet put off for a time the despatch of the 'Magenta.' General Della Marmora, however, clearly considered that Italian interests demanded the despatch of the expedition, though not on so large a scale as at first proposed. As the 'Magenta' had already sailed for Monte Video, the scientific members embarked at Naples, on the frigate 'Regina,' together with a large and rich collection of Italian products, an item of no small consequence in negotiating a commercial treaty. The gentlemen referred to were the Senator F. de Filippi, a zoologist and Oriental traveller of repute; Clemente Biasi, a former travelling companion of the same; and the author, H. H. Giglioli, now Professor of Zoology and Comparative Anatomy in the Royal Institute of Florence.

* *Viaggio intorno al globo della R. pirocorvetta Italiana 'Magenta.'* Dal Dottore H. H. Giglioli, Professore di Zoologia, ec., nel Regio Istituto di Firenze. Milano, 1875. 4to.

Professor Giglioli's book, or "Descriptive and Scientific Narrative," as he terms it, is indeed a *magnum opus*, comprising, as it does, close on eleven hundred closely-printed quarto pages. The exhaustive manner in which every subject is treated reminds us a little of the classic writer who, when writing of the Trojan War, felt it incumbent on him to trace events back from Leda and her eggs. But, at the same time, it would be unjust to accuse the author of diffuseness. He has only brought into play great industry and remarkable powers of research in connection with nearly every noteworthy topic which comes before him, and the result is a work of travel which, for completeness and interest, it would be difficult to surpass.

The 'Regina,' with Captain Vittorio Armijon, the envoy, on board, left Naples on the 8th November 1865, on its westward mission to join the 'Magenta' at Monte Video. On nearing the Canaries, the author takes opportunity of supplying us with a complete history of early voyages to these islands, together with a general sketch of Italian maritime discovery in the Middle Ages; and the crossing of the Line, and the discussion of the route of the 'Regina' across the Atlantic, gives occasion for a learned disquisition on the meteorology of that ocean, as far as it bears on the routes of sailing vessels. These instances, chosen at random from among numerous others, will show that Professor Giglioli loses no opportunity of making the most of his theme for the time being. Indeed, there are few subjects that he seems to be unacquainted with—geology, meteorology, ethnology, and zoology being apparently all equally familiar to him.

After touching at Rio Janeiro, where the author amassed considerable information of interest regarding Brazil, the 'Regina' passed on to Monte Video, where she fell in with the 'Magenta,' and transferred thither all the officers and stores. The 'Magenta' was a screw corvette, built in 1860-61, length 218 feet, breadth 40 feet, and 500 horse-power, nominal. Her regular crew numbered 345, all told; but, in order to allow for the storage of provisions for a long journey, this number was reduced to 297. She is described as a bad sailer, and as unable to make much more than 10 knots under steam. On the other hand, she was commodiously fitted up, well ventilated, and was stored with four months' provisions. On the 2nd February, the 'Magenta' set out, across the Southern Atlantic, on its voyage of circumnavigation round the globe. The records of long sea voyages are never, at the best, fraught with incidents of much interest; and Professor Giglioli's work, though interspersed with zoological notes of value, does not offer much scope for remark in treating of the vessel's route from Monte Video, round the Cape of Good Hope, to Batavia.

In Java, Professor Giglioli devoted some attention to the question of coffee-growing, which has there attained such prosperous dimensions, as well as to the revenue systems adopted in that island during the respective periods of English and Dutch rule. The present system was introduced by General Van Bosch, in 1830, and by a felicitous arrangement, by which the cultivators, land-owners, and others interested in the tillage of the ground, share, together with the Government, in the profits, the enforced cultivation

of colonial products has proved most remunerative to all parties, averaging a net profit to the State of over two millions sterling per annum during the forty-one years for which it has been in operation. As a recent writer has remarked, Java presents the spectacle of a gigantic estate, of unusual fertility, farmed to the mutual advantage of the Government and its subjects.

The 'Magenta's' next halting-place was Singapore, whence, after a stay of some days, she made for Saigon and Yokohama on the 26th May. Before dismissing the subject of the Malayan Peninsula, the author makes a brief digression concerning the Negritos, a race to which he assigns a wide distribution in former times, and remnants of which he professes to recognise in the Bushmen of Southern Africa, the Tikkitikki discovered by Schweinfurth, the (so-called) Mincopai of the Andamans and Nicobars, and the Samans of Malacca. This view Professor Giglioli has expounded in a separate paper, of which, if we mistake not, the present section is a reprint.

The description of Japan in Professsor Giglioli's book is particularly interesting. The inquisitive but good-natured curiosity of the natives, their customs, dwellings, and avidity for Western civilisation is given with a minute faithfulness which conveys a very vivid picture of the country. In spite, however, of the strides which Japan is making, Giglioli plainly avows that the massacres and persecutions which have been inflicted in past times on Western immigrants may not improbably re-occur, and he does not hesitate further to ascribe much of this intolerance to the arrogance of the Roman Catholic missionary priests, who followed in the steps of S. Francis Xavier, whose proselytizing efforts in the 16th century were attended with a most extraordinary success.

The treaty with Japan was successfully negotiated (after some preliminary obstacles) on the 25th August 1866, and the presents, amounting in value to 8000*l.*, were duly distributed among the chief nobles and other functionaries. Before leaving the country, Professor Giglioli witnessed, among other interesting sights, a Japanese drama, and, in the interval between the acts, had the privilege of being invited behind the scenes and regaled with tea in the "green-room." Professor Giglioli owns that he had more sympathy with the Japanese than with any other people encountered by him in the course of his journey, and it is doubtless to this love of his subject that may be attributed the successful and interesting picture he has given us of the country and the people.

From Japan, the 'Magenta' proceeded to the Gulf of Pechili, whence Captain Armijon and suite ascended the Peiho, and travelled to Peking with the object of concluding the wished-for treaty with China. Every assistance appears to have been given by the other legations, who hailed Captain Armijon's mission with the most friendly feelings; Dr. Williams, of the United States' Legation, informing him that he (Armijon) had the honour of being the first envoy sent from united Italy to China since the reign of Marcus Aurelius, exactly 1700 years previously! The treaty was ratified in state on the 4th November by Chung Hang, the Imperial Commissioner, and the ceremony was appropriately wound up by a banquet, with a *menu* of 150 dishes, where the members of the Italian mission were provided with silver plate and champagne quite *à l'Européene.*

In treating of China, it is noteworthy that Professor Giglioli is no clamourer for the abolition of the export of Indian opium. He has arrived at a decided opinion, based on the views of medical and other authorities, who have seen much of opium smoking in China and other parts, that its use is not a whit more injurious than that of alcoholic stimulants, and that its prohibition would be attended with as many difficulties as the total closing of our public-houses. It is as well to take note of such testimony at times when we are being assailed with propositions that "England, at all events, should wash her hands of the opium traffic"—a proposal the haziness of which is only equalled by the misery which it would clearly bring on the already impoverished millions of India.

The immediate objects of the mission having been achieved, the 'Magenta' left Hong Kong and the shores of China on the 26th January 1867, having previously left at that city Signor de Filippi, who had been seized with fever, an illness to which he succumbed on the 9th February. Signor Giglioli evidently felt the loss of his able co-adjutor most keenly and his dedication of the work to the memory of his friend is couched in affectionate language.

The remainder of the cruise of the 'Magenta,' from Batavia round the continent of Australia to Melbourne and Sydney, and thence along the western coast of South America, through the Straits of Magellan home, does not call for special notice, and we would conclude with a few general remarks on the work before us. If there were any regret that the record of the cruise and of Professor Giglioli's exhaustive researches had been long delayed, this feeling would be dissipated by the admirable manner in which every subject of importance has been worked up. Authorities in nearly every language appear to have been carefully consulted, and this, combined with a fascinating style, has produced a result most satisfactory, especially in these days of endless travel-book-making. We must not omit the commendation due to the excellent printing and editing, and to the numerous woodcuts, which, being principally from photographic originals, convey ethnographical details with considerable faithfulness.

Narrative of the North Polar Expedition. U.S. Ship, 'Polaris,' Captain C. F. Hall, commanding. Edited by *Rear-Admiral C. H. Davis, U.S.N.* (Washington, 1876.)

Scientific Results of the United States' Arctic Expedition. Steamer 'Polaris,' C. F. Hall commanding. Vol. I. Physical Observations by *Emil Bessels.* (Washington, 1877.)

The Narrative of the 'Polaris' Expedition was prepared from official papers and from the journals of officers and men, by Admiral Davis, of the United States' Navy, who died before the final revision of the proofs was completed. The book was brought out by Professor Nourse, of the Washington Observatory. It will be remembered that the statements of the officers of the 'Polaris' were very contradictory as to the state of the sea and ice at the most northern point reached in Robeson Channel. Admiral Davis, after weighing all the evidence, says that the ice was so compact that it was impossible to force the vessel through, and that, so far as could be seen, there was no open space to the north. He quotes

Herman Siemen's journal, who says "we saw firm ice from one coast to the other." It is, we are told, impossible to determine the precise latitude of the 'Polaris' at her highest point, for there was no observation; but the American Hydrographic Office has placed it at 82° 11′ N. They had, in fact, reached the edge of the Palæocrystic floes. This official narrative will prove a valuable record for reference, and is very handsomely printed and illustrated. The first volume, containing the results of observations taken by Dr. Bessels, treats of the hydrography, temperature of the air, hygrometrical observations, atmospheric pressure, winds, solar radiation, terrestrial radiation, the face of the sky and state of the weather, observations on ozone, meteorological observations taken at sea, the chronometer journal, astronomical observations, pendulum experiments, magnetic observations and lists of Auroras, and psychrometrical tables. The remarks on the currents and the discussion of tidal observations are very elaborate, while the whole volume contains a mass of carefully-reduced observations, which, considering the exceptional difficulties under which Dr. Bessels laboured, are most praiseworthy. We have pleasure in congratulating him on the appearance of this volume, the first instalment of his valuable labours in the Arctic Regions.

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THE AMERICAN NATURALIST for September, 1877. (Boston: H. O. Houghton & Co.; London: Trübner & Co.)

THE *American Naturalist* for September contains three papers of special interest. The first is an elaborate and well-illustrated paper on "Reproduction in Fresh-water Algæ," by Baron D. Halstead. This is followed by one on "Surface Geology of the Merrimack Valley," by Warren Upham, a subject which will prove of great interest to summer travellers in New Hampshire and the North-eastern parts of Massachusets. The third is an essay by Dr. Joseph Leconte "On Critical Periods in the History of the Earth, and their relation to Evolution; on the Quaternary as such a Period." These papers constitute the body of the number under notice; but there are besides reviews of new books treating on Natural History; general notes in the various departments of science, and scientific news, which well deserve perusal.

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LIVINGSTONIA. By *F. A. Edwards.* (*Gentleman's Magazine* for October. Chatto and Windus. 1877.)

THE current number of the *Gentleman's Magazine* contains an article on "Livingstonia," from the pen of Mr. F. A. Edwards. The paper is an excellent *résumé* of the progress of the mission, named after the great traveller, from the time when it left our shores, in 1875, under the able leadership of Mr. Edward D. Young, R.N.; and we have very little doubt but that it will be read with great interest by all concerned in the welfare of Africa. A sketch map accompanies the paper.

THE CENTRAL AFRICAN EXPEDITION OF THE CHURCH MISSIONARY SOCIETY, under Wilson and O'Neill, reached the Ukerewe (Victoria) Lake on the 29th January last, after a six months' journey, and touched it at the same point that Stanley did. They had since proceeded northward and had traversed the Ituru country, where Stanley had fought with the natives two years before, but found them peaceably disposed, and apparently ignorant of the affray referred to. In Kagehyi, Stanley's old camp on the southern shore, they found the grave of Frederick Barker, his companion. The expedition hoped shortly to be able to launch a vessel on the lake, and to cross over to King Mtesa, of Uganda, and so to found, with that chief's aid, a well-organised and prosperous mission station.

Cartography.

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Kanitz's Map of Bulgaria and the Balkans.

THE long-expected Map of Bulgaria and the Balkans, by F. Kanitz,* referred to in our May number as having been awarded a prize, while in preparation, at the Paris Exhibition of 1875, embodying the topographical results obtained during fifteen years of travel, has at length been published. An edition with French title and notes is issued separately by Messrs. Hachette,† and a German edition,‡ coloured to show the political divisions, is given with the September number of *Petermann's Mittheilungen*. The map embraces the whole belt included between the Danube and the southern slopes of the Balkan range, from the valleys of the Morava and Timok, on the west, to the Black Sea coast on the east, and has been reduced by the photo-zincotype process from the original drawing by Herr Kanitz, on the scale of $\frac{1}{420000}$, into one sheet on the scale of $\frac{1}{630000}$, or nearly 10 English miles to an inch. The routes traversed by Herr Kanitz form a close network over the whole of this region, and include not fewer than seventeen crossings of the Balkans by distinct passes. The points astronomically and trigonometrically fixed by the Russian and Austrian surveyors have served as a basis for the map; but beyond these the whole work depends exclusively upon Herr Kanitz' original surveys and measurements. Comparing it with the sheets of the map issued by the Vienna Institute,§ which embrace the same ground, on nearly double its scale, it is found to be even richer in detail in some portions, at the same time presenting very considerable differences in topography from the Austrian map. The chief towns and boundaries of vilayets, mutessarifliks, circles, and districts are distinguished by separate signs, as are also the Christian and Muhammadan villages, the convents, fortifications, and post stations, besides railways, highways and carriage roads, paths and mountain tracks.

Very unfortunately, the rapid process which has been adopted in reproducing Herr Kanitz' drawing, and the great reduction in the lettering, have resulted in giving a generally blurred and hazy appearance to the map, and in making fully a third of the names it contains all but illegible.

Stanford's Library Map of Africa.‖

WE have received from Mr. Stanford a new edition of his Library Map of Africa, which is well known as the largest in scale, and the best general map of the continent in existence. Indeed there is no other to compare with it. In this edition the results of all the later explorations, such as those of Cameron in the south, of Nachtigall in North Africa, of Colonel Gordon's staff in the Nile basin, and of the missionaries in Madagascar, seem to have been duly incorporated. Recent political changes, including the annexation of

* Author of *Donau-Bulgarien und der Balkan:* Historisch-geographisch-ethnographische Reisestudien aus den Jahren 1860-1875. Leipzig, Bd. I., 1875; Bd. II., 1877.

† Carte Originale de la Bulgarie-Danubienne, des Balkans, et du sud-est de la Serbie, d'après ses notes de voyage, par F. Kanitz.

‡ Original-Karte von Donau-Bulgarien, dem Balkan, und Süd-ost-Serbien, nach seinen Reise-aufnahmen von F. Kanitz. $\frac{1}{630000}$.

§ K. K. Militargeogr. Institut. "Karten Türkischer Landestheile, aus den General Karten von Central-Europa." Scale, $\frac{1}{300000}$. Secs. N. O. P., 11 and 12.

‖ Stanford's Library Map of Africa, constructed by A. Keith Johnston, F.R.S.E. (London: Stanford. 1877.) Scale 94 miles = 1 inch. 4 sheets.

the Transvaal to the British dominion and the extension of Egyptian rule, are also clearly indicated by the colouring. Of late years it has, indeed, become a very difficult matter to keep pace in cartography with the rapid march of African discovery, especially to maintain any general map of the continent on a large scale, so closely up to the level of ever-increasing information, as to make it at any moment a true representative of existing knowledge. Most of the existing geography that can be shown on it is also made up by compiling or weaving together many inperfectly-surveyed routes, and each newer, or more accurately-determined line necessitates a re-adjustment of the entire surrounding portion of the geographical web. A weekly or monthly edition of such a map as this would now seem to be almost necessary. Since this edition was published, a few days ago, for example, the completion of Stanley's grand march across the tropical belt has filled up the main feature of the great blank which here appears separating the Lualaba from the Congo, and the publication of Dr. Pogge's itinerary to the capital of the famous West-African potentate, the Muata Yanvo, has thrown new light on the region which lies inland from the Portuguese West-African possessions.

Log Book.

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Mr. Stanley's Discovery of the Course of the Congo.—*The Daily Telegraph* has published the following important news of Mr. Stanley's discovery, dated from Embomma, on the Congo, on August 10, 1877.—"On the 8th inst. I arrived at this place from Zanzibar, with 115 souls, in a fearful condition. We left Nyangwe in Manyema Nov. 5, 1876, travelling overland through Ureggu. Unable to make progress through the dense forests, we crossed Lualaba, and continued our journey along the left bank, through North-East Ukusu. Natives opposed us, harassed us day and night, killed and wounded our people with poisoned arrows. Our struggle through these cannibal regions became almost hopeless. We endeavoured to appease the savages with gifts and mildness. Our gifts they refused; our patient behaviour they regarded as cowardice. To make our position still more deplorable, our escort of 140 men engaged at Nyangwe refused to proceed farther. At the same time the natives made a grand effort to crush us altogether. We defended ourselves, but there was only one way to escape from our hapless position—unless we accepted the alternative of returning, and abandoning the work which we had begun—and this was by making use of our canoes. Though we had decided advantage over the savages on the water, still each day's advance was but a repetition of the day previous. It was desperate fighting, pushing on down river with might and main until, in the midst of these successive struggles, we were halted by a series of great cataracts—five in number—not far apart—south and north of the Equator. To pass these we had to cut our way through thirteen miles of dense forest, and drag our eighteen canoes and exploring boat overland, frequently exchanging the axes for the rifles as we were attacked. After passing these cataracts we had a long breathing pause from the toil of dragging our vessels overland. At 2° north latitude the Great Lualaba swerved from its almost direct northerly course, to north-west, then west, then south-west; a broad stream from two to ten miles wide, choked with islands. In order to avoid the exhausting struggle with so many tribes of desperate cannibals, we had to paddle between the islands, until, compelled by hunger most extreme, after three days passed without absolutely any food, we resolved to meet our fate, and struck for the mainland on the left bank. Happily, we had reached a tribe acquainted with trade. They possessed four muskets from the West Coast, and they called the great river Ikutu Ya Congo. We made blood brotherhood, and purchased abundance of provisions; and endeavoured to continue our course along the left bank. Three days later we came to a powerful tribe all armed with muskets, who, as soon as they sighted us, manned 54 large canoes, and attacked us. Not until three of my men were killed did I desist from crying out we were friends, and offering cloths. For a distance of 12 miles the greatest and most desperate fight on this terrible river was maintained. This was the last, save one, of the 32 battles on the Lualaba, which river, after changing its name scores of times, became known as we approached the Atlantic Ocean as the Kwango and the Zaire. As the river runs through the great basin which lies between E. long. 26° and E. long. 17°, it has an uninterrupted course of over 1400 miles, with magnificent affluents, especially on the southern side. Thence, cleaving the broad belt of mountains between the great basin and the Atlantic Ocean, it descends by about 30 falls and furious rapids to the great river between the Falls of Yellala and the Atlantic. Our losses have been most severe, and my grief is still new over the loss of my last white assistant, the brave and pious young Englishman, Francis Pocock, who was swept over the Falls of Massassa, on June 3, last. The same day I with seven men was almost drawn into the whirlpools of Mowa Falls: and six weeks later myself, and the entire crew of the Lady Alice, was swept over the furious Falls of Mbelo, whence only by a miracle we escaped. My faithful young companion Kalulu is also among the lost.

"From Boma I take the expedition by steamer to Cabinda, thence to St. Paul de Loanda."

The Whaling Fleet.—The following has been the take of the Baffins Bay whaling fleet:—

'Arctic'—180 tons of oil (7 whales and 380 white whales)
'Aurora'—130 tons of oil
'Esquimaux'—105 ,,
'Polynia'—78 ,,
'Camperdown'—70 ,,
'Narwhal'—55 ,,
'Jan Meyen'—48 ,,
'Victor'—45 ,,
'Nova Zembla'—32 tons of oil
'Ravenscraig'—30 ,,
'Erik'—12 ,,
'Intrepid'—10 tons of oil (22 narwhals)
'Active'—8 tons of oil (42 walruses)
'Harold Haarfager' (*clean*)

The total catch was 753 tons. Last year it was 891 tons.

Captain Adams, in the 'Arctic,' went first to Newfoundland for seals, and proceeded thence to the fishing ground, where he succeeded in catching 24,000 seals (of which 1500 were the large hood seals), representing 350 tons of oil. In the second voyage he got 6100 old seals, yielding about 150 tons. Altogether the 'Arctic' doubled the best ship in the whole Newfoundland fleet. On May 25th, Captain Adams left for Baffins Bay, and joined the rest of the

fleet in Melville Bay. He reports that this year there was no North Water, and that there was one block of ice from Smith Sound to Cape Farewell. After visiting the Cary Islands, where the depôt of the Arctic Expedition was found to be untouched, he reached Lancaster Sound with great difficulty. The 'Arctic' experienced a very severe nip off Navy Board Inlet. At Admiralty Inlet he got eight fish, and another in Prince Regent Inlet, but the whole country was encumbered with ice to an unusual extent. In Elwon Inlet, Captain Adams obtained 385, and the 'Aurora' 550 white whales. Captain Adams brought home a very intelligent leading Eskimo, named Olnik, from Cape Eglinton, last year, who passed the winter at Dundee, visited London, and dined with the Lord Mayor. He was landed at his settlement again, where he was very cordially received by his family and friends. A general meeting was held, and Olnik related all his adventures, and all the wonderful things he had seen, the audience listening with wrapt attention. On the 2nd of September, Captain Adams left Cape Eglinton and bore up for Dundee. In Ponds Bay he caught no fewer than 3000 salmon in two tides by an improvised net. The 'Arctic' reached Dundee on Tuesday, the 18th of September.

Sea Communication with Northern Siberia.—The 'Polar Star,' the first vessel ever constructed at Yenisseisk, and the property of M. Sidorof, has arrived in Norway, in twenty-one days' time, from the mouth of the Yenissei. M. Schwanenberg, the skipper, telegraphs as follows:—"Arrived safe and sound at Wardö. I fell in with the steamer 'Frazer' on the 9th August at Golchitka. I doubled Bely Island, where I hoisted the Russian flag on a mast, and left an account of my trip, written in three languages, in a sealed-up bottle. I saw plenty of reindeer at Bely Island. I encountered ice in the Matochkin Strait, and crossed the Sea of Kara on the 18th August. The winds were contrary, and accompanied with sleet. The ship is a bad sailer."

The Wyse Darien Surveying Expedition.—We have given some account of the proceedings of this Expedition in former numbers, and now record the results that have been attained. The object of the undertaking was to survey for a canal without locks or tunnels, by way of the Poyita and Cacarica Rivers, as it was supposed that a deep hollow existed between the Acquiagua Valley and an imaginary valley to the left of the Paya River. The party found that the Acquiagua gorge does not touch the Paya basin. The levels taken along the Paya River, which is full of rapids, gave the village of Paya a height of 250 feet above the lowest level observed on the Tuyra at Pinogana. Following up the Paya River on the Pacific side, the party reached a point less than 330 yards from the Nalubquia, a tributary of the Cacarica, on the Atlantic slope. The gorge of the Tihule is 420 feet above the level of the Tuyra River at Pinogana, and 450 feet above the lowest tides. These figures destroy all hopes of opening a canal through a gap between the Cordilleras without locks or tunnels. M. Celler proposes, as an alternative, the construction of a canal about 65 miles long, with reservoirs and groups of locks. It would start at Real de Santa Maria, on the Tuyra, by Pinogana and the Cupé River, to the high plains in the Upper Tuyra, then down the Tulequa, on the Atlantic slope, to the Atrato, avoiding the windings of the Cacarica. The summit, by this route, is about 160 feet above the sea. Lieutenant Wyse afterwards explored the Valley of the Chacunaque River, and suggested another canal thence to the Atlantic, near Point Gandi.

Altitudes in Bolivia.—The following altitudes in English feet, taken by Mr. Minchin this year, result from boiling-point observations, the approximate height in the tables being augmented by its 900th part multiplied by the difference between the sum of the air temperatures at the upper and lower stations, and 64° F., to which a small correction for the hourly variation is applied.

The temperature of the lower station (sea level) is assumed to bc 72° F. in the morning and evening, and 75° F. during the daytime:—

Place.	Height.	Place.	Height
Sucre	9,319	Leñas...	13,079
Pampatambo	9,971	Tolapalca	13,572
Siporo	11,003	Calamarca	13,182
Machacamarca	12,849	Cucuta	12,936
Mamahuasi	9,835	Viacha	12,534
Ocuri	13,096	Corocoro	12,948
La Palca	12,002	Sebollallu	8,279
Colquechaca	13,849	Junction of La Paz and Sebollallu Rivers...	7,542
Quebrada Honda ...	11,598	Carapata, 65 ft. above Lake Titicaca ...	12,576
Bartolo	11,206		
Samasa	12,097		
Potosi	13,024		

The exact height of Lake Titicaca, according to the levels in the Arequipa and Puno Railway, is 12,545 feet.

Making use of this for the upper or lower station, and being able to estimate the temperature of air more closely, the following altitudes result:—

Place.	Height.	Place.	Height.
La Paz	11,972	La Cueva (Tora) ...	2,235
Achacachi...	12,557	Tipuani	1,820
Sorata	8,715	El Huanay	1,400
Pestia...	5,403	Tuanani	3,533

Highest point of pass to Yungas, on La Paz Cordillera, levelled with spirit level from La Paz, 15,308 feet; also of La Paz (level of plains) by angles from city, 13,413 feet; Illimani, from angles at La Paz and Ventilla, 21,039 feet; Cerro Hermoso, by angles from Colquechaca, 16,490 feet.

Altitudes by aneroid, corrected by boiling point observations, at similar heights:—

Place.	Height.	Place.	Height.
Oruro	12,180	Ancacato	12,700
Cochabamba	8,880	Sicasica	12,430
Santa Cruz	1,500	Misque	6,434
Payña, almost on level of Lake Poopo ...	12,280	Aiquili	7,300

	Lat.		Long. W. Greenwich.
Sucre	19° 02′ 45″	...	65° 17′ 00″
La Paz	16° 29′ 59″	...	67° 58′ 45″

Guatemala.—The system of telegraphic communication is now complete throughout the Republic of Guatemala, and embraces 1073 miles of wire, with forty-two stations. A railroad is also projected between the port of San José, on the Pacific, and the city of Guatemala, the contractor being Mr. Wm. Nanne. Coffee is being cultivated and exported

to a great extent, the yield this year being nearly 15,000,000 lbs., worth $3,000,000. Education is also receiving attention, and the number of schools throughout the country has recently been increased. This moral and material progress is due, in a great measure, to the firm, yet liberal and enlightened, rule of President Barrios.

The Marquesas Islands.—According to a report of Captain Miner, of the U.S. steamer 'Potomac,' who arrived at S. Francisco in the early part of July last, from the Marquesas and Society Islands, the tidal wave, which proved so disastrous in Peru on the 9th May last (see our number for August, p. 206), was felt on the same day at Nukahiva and Tailohae Bay, where the wave rose to a height of 14 feet. The fine plantations of Captain Hart were destroyed, and the natives fled for refuge to the neighbouring hills. A peculiar feature was the heavy fall of rain which ensued, and which lasted twelve days and occasioned great disasters.

Heights in the Alai and Pamir.—Captain Kostenko writes to the *Russische Revue*, to express his regret that there are some mistakes in the heights given by him in his letters descriptive of the recent Russian military expedition in the Alai country. The correct heights, in feet, are as follows:—

Gulcha	5,100
Kizyl-Kurgan	5,600
Sufi-Kurgan	6,600
Archat Pass	11,900
Camp on Kizyl-su	10,100
Mouth of Kizyl-art Ravine	11,400
Kizyl-art Pass	14,000
Kara-Kul Lake	13,200
Ala-Baital Pass	15,400
Confluence of Uzbel-su and Chonsu ...	13,300
Uzbel Pass	15,200
Foot of ditto	14,300
Archi-bulek, on Alia	10,000
Darant-Kurgan	8,000
Great Karamuk	7,400
Gurumdu Pass	10,600
Kara-Kasyk Pass	14,400
Kishlak-Shah-i-mardan...	4,400
Wadil (town)	2,800

The limit of snow on the Pamir is between 16,000 and 17,000 feet, and on the Alai Mountains 14,000 feet.

Correspondence.

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EARTHQUAKES ON THE COAST OF PERU.

To the Editor of the "Geographical Magazine."

Sir,—I beg leave to make the following remarks concerning the article, "The Great Earthquakes on the Coast of Perú," which appeared in your number for last August.

In the part of it that gives an account of the great earthquake at Mendoza, March 20, 1861, it is said that no shocks were felt in Chile. This is not so, for I experienced in Valparaiso, at 8h. 35m. of the same day, a violent undulating movement, which lasted fifty seconds. This shock was felt everywhere in Valparaiso, and the people ran into the streets. The barometer read 759·5 min., and the temperature of the air was 18° C.

On the 13th of August 1868 I saw in Valparaiso at 8h. 30m. P.M. a strange phenomenon of luminous nature towards the south, which resembled lightning, but was of much longer duration. There were no clouds to be seen, and the weather was fine. I booked this phenomenon in my meteorological journal, not having then the least knowledge of the great earthquake in Perú. The barometer was pretty high (about 766 min., uncorrected) and the temperature 9° C.

1873. July 7.—No houses in Valparaiso were thrown down by the earthquake, but some in the Puerto were damaged (not in the Almendral, where the houses are smaller). The shock was stronger in Limache and Quillota, and strongest a little farther to the north (la Ligua). In Limache the roofs of several houses came down, but no lives were lost. In Santiago, where I was living, the shock was also very strong, though not so violent as in Valparaiso.

I hope that you will kindly excuse my having encroached upon your valuable time, and remain respectfully, yours, &c.,

J. Asmus,

Assistant in the Hydrographic Office of the Imperial Admiralty.

Matthäikirch strasse 9, Berlin W.

August 23, 1877.

—:o:—

To the Editor of the "Geographical Magazine."

Sir,—The *Academy* of 18th Aug. tells us that "*a remarkable* natural phenomenon, supposed to be connected with the recent great earthquakes on the Pacific Coast," has happened in the district of Charcas, on the Pacific Coast, by a "rapidly-increasing" lake. If we attend to the laws of Nature, we see nothing remarkable in this. By referring to the chapter on earthquake in my *Incidents in the Biography of Dust*, lately sent to you, it will be seen that many earthquakes have been attended with subsidings of surface areas into water, so that lakes and swamps have been suddenly formed, where dry land previously existed. The submerged area does not necessarily exhibit to us the entire extent of subsidence. In the earthquake alluded to, that subsidence was extensive enough to cause the waves which rolled over the Pacific Ocean. These incidents are sufficient proof, that earthquakes are not always connected with volcanic action, and that the evasion of subterranean waters do cause subsidencies of surface areas into the water which had destroyed the foundations.

H. P. Malet.

Homburg, *August* 19, 1877.

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COPPER MINES IN SOUTH AFRICA.

To the Editor of the "Geographical Magazine."

Sir,—I read with much surprise, in the last number of the *Geographical Magazine*, the statement of Sir James Alexander, that he was the discoverer of copper in South Africa. The existence of copper ore in the neighbourhood of Sir James' researches was known nearly two centuries ago, as an extract from the report made to the Dutch Government of the Cape Colony, of which I enclose copy, will clearly show.

I resided at the Cape before Sir James made his *discovery*, and can assure you that it was well known in Cape Town that copper ore was abundant in the neighbourhood of the Orange River, and some hills or moun-

tains were marked on the old maps "Kopperbergen." By publishing this you will oblige

A SUBSCRIBER.

LONDON, *September 21st*, 1877.

"*Report to the Governor, Ryk Tulbagh, by Carl Christoffel Rykvoeh, who was appointed to the Commission for Examining the Country of the Namaquas, in* 1762.

"After my arrival at the first great copper mountain, which was visited by the Governor, Simon van der Stell, and others in 1685, I found, upon examination, that the ore of that mountain produced but a very trifling quantity of copper.

"I then proceeded to examine the small copper mountain lying close to it, and discovered that the same, *pro rata*, possessed more copper. This, which is a circular mountain, is situated upon a plain, about 40 or 50 yards high (one can walk round in about a quarter of an hour), and, if sufficient water and fuel could be found, which at present cannot, mining operations might be here commenced.

"I then proceeded to the Great, or Gariep River, and examined with great accuracy the copper ore which is seen in the mountain, standing along the river, being a green ore of the same description as that which the Burgher, Jacobus Coetzee, in the year 1760, upon his return journey, brought some specimens of, and, by a small proof, found that it contained more than a third of pure copper. This mountain consists entirely of high and hard rocks, being in various places marked by veins of green, intermixed with white, which gives the mountain the appearance of white marble; while, in other places, veins looking like copper show themselves," &c.

The above was dated Cape of Good Hope, May 4th, 1762.

Proceedings of Geographical Societies.

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FRENCH GEOGRAPHICAL SOCIETY.

August 1st, 1877.—M. LEVASSEUR presiding. A letter was read from M. LOUIS DESGRAND, President of the Geographical Society of Lyons, communicating certain criticisms passed by Colonel Champanhet, in a paper recently read before the Society, on M. Roudaire's scheme of an inland sea in the *cholts* of Algeria. The Colonel's objections to the project are, that it will benefit the Tunisians, Italians, and Germans more than the French and Algerians, and that it would not, in any way, serve to the latter as a route into the interior; that the humidity of the atmosphere will principally benefit Tunis; that it will take thirty years to construct; that, when completed, it will be liable to the same desiccation which overtook the former sea there; and, lastly, that it is quite useless to expect it will act as a barrier to the invasions of the locusts, as this pest is encountered in the Balearic Islands

M. JULES CREVAUX writes from Cayenne, under date the 2nd of July, to announce his departure for the Sierra de Tumucuriac on the 10th of August. He proposes to reach the interior of French Guiana by way of the Maroni, and is to be accompanied by M. Emonet, the apostolic prefect, and Père Kroenner, a misssionary, the latter having been already sent on ahead to buy boats and hire crews. On reaching the mountains the boats will, of course, be abandoned, and the hardest part of the journey will begin.

Announcement was made that the Triennial International Congress of Geodesy would be held at Stuttgart in the last days of September, under the presidency of the Spanish General Ibanez, the vice-president being Professor Bauerfeind, formerly of the Polytechnic School of Munich. The Dutch Geographical Society communicated information respecting the departure of the Sumatra Exploring Expedition from Padang, in May last, and their successful progress.

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ANTWERP GEOGRAPHICAL SOCIETY.

WE have received the *Bulletin* of this Society, which dates its existence from the 1st of October 1876. The President is Lieut.-Col. H. Wanwermans; Vice-Presidents, Dr. Louis Delgeur and Consul E. A. Grattan; and General Secretary, P. Gerrard. The opening meeting took place on the 14th January 1877, when an introductory address was delivered by the President, and the names of the effective and honorary members announced. Among the latter are the following: Sir G. Airy, Sir B. Frere, Dr. Bastian, Herr von Becker, Signor Correnti, M. Delesse, Dr. von Hochstetter, M. de Khanikof, Count de Lesseps, Mr. Major, Commendatore Negri, Dr. Petermann, Sir H. C. Rawlinson, Admiral Richards, Admiral de la Roncière-le-Noury, M. P. J. Veth, and M. Vivien de St. Martin. Among the corresponding members are Dr. Behm, Signor Cora, Herr O. Delitsch, and Major Wilson.

Two prizes of 500 francs each were announced for competition. The one presented by Baron van de Werde and de Schilde is for the best history of a Belgian, belonging to Antwerp by birth or family, who by his labours or discoveries has contributed to the progress of geography. Competitors are allowed to select whom they please; their attention is, however, drawn to the names of Peter van den Broecke, born at Antwerp about 1580; J. B. Grannuaye, born towards the end of the sixteenth century; J. A. Cobbe, born 21st March 1682; and F. B. Solvyns, born 6th July 1760. The second prize of 500 francs, awarded by the Councillors of the Society, is to be awarded for the best description of the Azores and history of their colonisation from the Belgian point of view.

The *Bulletin* contains two interesting original papers: one by the President on the Sources of the Nile, the other by Dr. L. Delgeur on the Slave Trade.

Death of the late President of Chile.—We regret to have to announce the sudden death, on the 20th of last July, of Don Frederico Errazuriz, the late President of Chile, whose administration did so much to further the work of marine surveys, and to establish an efficient hydrographic department.

NOTICE.

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